GENERAL LIBRARY
MAY 19 1920
UNIV. OF MICH.

PROCEEDINGS

OF THE

AMERICAN SOCIETY

OF

CIVIL ENGINEERS

VOL. XLVI—No. 4

AMERICAN SOCIETY OF CIVIL ENGINEERS FOUNDED 1852

April, 1920

Published by the American Society of Civil Engineers at its Headquarters, 33 West Thirty-ninth Street, New York, the Fourth Wednesday of each Month, except June and July.

Copyrighted 1920, by the American Society of Civil Engineers.
Entered as Second-Class Matter, December 14th, 1896, at the Post Office at New York, N. Y., under the Act of March 3d, 1879.
Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3d, 1917, authorized on July 5th, 1918.
Subscription, $8 per annum.

Vol. XLVI. APRIL, 1920. No. 4.

AMERICAN SOCIETY OF CIVIL ENGINEERS

INSTITUTED 1852

PROCEEDINGS

This Society is not responsible for any statement made or opinion expressed in its publications.

SOCIETY AFFAIRS

CONTENTS

	PAGE
Minutes of Meetings:	
Of the Society, March 17th and April 7th, 1920	397
Items of Interest	402
Announcements:	
Hours during which the Society House is open	412
Future Meetings	412
Engineering Societies Employment Bureau	412
Searches in the Library	412
Papers and Discussions	412
Local Associations of Members of the American Society of Civil Engineers	413
Privileges of Engineering Societies Extended to Members	425
New Books	426
Membership (Additions, Deaths)	431
Recent Engineering Articles of Interest	438

MINUTES OF MEETINGS

OF THE SOCIETY

March 17th, 1920.—The meeting was called to order at 8.30 P. M.; Director J. S. Langthorn in the chair; Herbert S. Crocker, Acting Secretary; and present, also, 169 members and guests.

The meeting was devoted to an informal discussion on "The Nation-Wide Demand for Improved Highways". The discussion was opened by H. G. Shirley, M. Am. Soc. C. E., whose subject was "General Survey of the Highway Situation". Mr. Shirley was followed by Messrs. W. G. B. Thompson on "Historical Sketch of Traffic and Types"; E. J. Mehren, on "How Much can We Afford to Spend for Highways per Mile?"; George H. Pride, on "Permissible Cost Based on Saving in Haulage"; H. Eltinge Breed, on "Need of Adequate Maintenance—Its Bearing on First Cost"; H. E. Hilts, on "Suggestions on How to Complete the 1920 Programme of Highway Construction"; Robert S. Parsons on "Permanent Highways as an Aid to Railroads"; and T. Kennard Thomson.

On motion, duly seconded, a vote of thanks was given the speakers of the evening.

The Acting Secretary announced the election of the following candidates on March 9th, 1920:

As Members

Julius Adler, Philadelphia, Pa.
William Daniel Chamberlin, San Francisco, Cal.
Christopher Tompkins Chenery, Washington, D. C.
Elmer White Clark, Pittsburgh, Pa.
John William Ferguson, Portland, Ore.
Eugene Bruce Ford, Seattle, Wash.
Henry Lehmberg Hagerman, Greenville, S. C.
Hugh Ellmaker Hale, New York City
Merrill Hibbard, Columbus, Ohio
David Henry Lane Kneedler, Philadelphia, Pa.
Harry Martin Nabstedt, Davenport, Iowa
Andrew D. Schindler, San Francisco, Cal.
Frederick E. Schmitt, Montclair, N. J.
Clarence Osborne Sherrill, Washington, D. C.
John Clayton Tracy, New Haven, Conn.
Francis Spinner Wells, Malden, Mass.
Thomas Leroy Willis, New Orleans, La.

As Associate Members

Ralph Wentworth Adams, Spokane, Wash.
Jerome Eric Barieau, East Auburn, Cal.
Henry Claus Beckman, Chicago, Ill.
Merrill Monfort Bernard, Crowley, La.
Isador Leon Birner, Omaha, Nebr.
Arthur Hazard Bond, New Haven, Conn.
Percy Dalles Brown, Philadelphia, Pa.
John Albert Charlton Callan, Austin, Tex.
Donald Eugene Ames Cameron, Toledo, Ohio
John Titreville Campbell, Pittsburgh, Pa.
Arthur William Consoer, Dallas, Tex.
Claude Carlisle Coykendall, Ames, Iowa
Frank Fitzpatrick Du Bose, Dallas, Tex.
Robert Muratt Dunlap, Chicago, Ill.
Richard Leech Elton, Kansas City, Mo.
Lewis Azro Emerson, Columbia, S. C.
Orville Alva Faris, Boise, Idaho
Georg Carl Gustav Schlichting Franck, New York City
Gilbert Houston Gilchrist, Dallas, Tex.

ALBERT EDWARD GOODWIN, Sewickley, Pa.
ISAAC GUTMAN, San Francisco, Cal.
ROSS AMERSON HARBAUGH, Oil City, Pa.
JOHN KELLAR HARRIS, Sharon, Pa.
JAMES OLIVER HOGG, JR., Kansas City, Mo.
NICHOLAS FIRTH JAHN, Seattle, Wash.
GILES MATTHEW JOWERS, San Antonio, Tex.
RAYMOND JOSEPH KEAYS, Perth Amboy, N. J.
HENRY MOENNICK KLEIFELD, Spokane, Wash.
LEANDER LARSON, Camp Eustis, Va.
JAMES PATRICK MCAVOY, Albany, N. Y.
CLAUDE LEON MCKESSON, Portland, Ore.
GEORGE PLUMMER MCNEAR, JR., New York City
FREDERICK TRAUGOTT MARTIUS, Dallas, Tex.
FOSTER GILBERT MORSS, Salt Lake City, Utah.
ALONZO MARSH MUTERSBAUGH, San Antonio, Tex.
BLAINE NOICE, Los Angeles, Cal.
JAMES WILLIAM NORTON, Carlisle, Ky.
FRANK HARRY NYGREN, Brooklyn, N. Y.
CHESTER WHITE OGDEN, Roanoke, Va.
GEORGE ORR, Atlantic City, N. J.
EDMUND NIKOLAI PETERSON, Paris, France
RALPH WHITNEY REYNOLDS, New York City
HARRY NORMAN ROBERTS, Longview, Tex.
WALTER HAROLD ROOT, Ames, Iowa
NICHOLAS A. SAIGH, Camp Travis, Tex.
MARK SEBASTIAN SANDERS, Kobe, Japan
EDWARD GOODRICH SEMON, Albany, N. Y.
HARRY A. SERAN, Pensacola, Fla.
WILL GERALD SHURGAR, Meridian, Miss.
MERRIL FORESTER SNELL, Pittsburgh, Pa.
FRANK CHARLES TEWS, Spokane, Wash.
WILLIS GERSHAM WALDO, Chattanooga, Tenn.
HOWARD CHARLES WICKES, Cincinnati, Ohio
NATHAN WOHLFELD, Dallas, Tex.
LESTER OREN WOLCOTT, Fresno, Cal.

AS ASSOCIATES

JOHN NOTMAN THORP, JR., Chicago, Ill.

AS JUNIORS

AVEY MARTIN BAKER, New York City
HAROLD RHODES BASSETT, Washington, D. C.
IRWIN EUGENE BURKS, Springfield, Mo.
JEROME BRASIL FRANCIS CROWLEY, New York City

Victor Timothy Givotovsky, New York City
Michael Charles Grenata, Camp A. A. Humphreys, Va.
Albert Haertlein, Cambridge, Mass.
Cho-Pin Hsueh, Ithaca, N. Y.
George Alvin Nordgren, Chicago, Ill.
Francis Harloe Phipps, Mount Vernon, N. Y.
Frank Martin Schilling, Philadelphia, Pa.
Chen Tan, Ithaca, N. Y.

The Acting Secretary announced the transfer of the following candidates on March 9th, 1920:

From Associate Member to Member

Eugene Yorke Allen, New York City
Harold Willoughby Benedict, Troy, N. Y.
Roy Winchester Crum, Ames, Iowa
Howard Kingsbury Holland, Ann Arbor, Mich.
Hugh Browning Holmes, New York City
Elmer Thomas Howson, Chicago, Ill.
Battle Hargrove Klyce, Nashville, Tenn.
Albert Larsen, Dayton, Ohio
Leon Roderick MacKenzie, Des Moines, Iowa
Franklin R. McMillan, Philadelphia, Pa.
Neal Albert Melick, Newark, N. J.
Herbert Drummond Mendenhall, Lakeland, Fla.
William Taft Newcomb, Easton, Pa.
Charles William Okey, Peoria, Ill.
Fred Dale Pyle, Montrose, Colo.
Robert Isham Randolph, Chicago, Ill.
Arthur Richards, Columbus, Ohio
Arthur Valentine Ruggles, Cleveland, Ohio
Charles Herman Ruggles, West Palm Beach, Fla.
Arthur Johnson Sackett, Newark, N. J.
Alfred George Schutt, Detroit, Mich.
Eugene Adalbert Silagi, Columbus, Ohio
Joseph Springer Swindells, New York City
Lyle Antrim Whitsit, Tokyo, Japan

From Associate to Associate Member

Frank Louis Reynolds, New York City

From Junior to Associate Member

Otto William Julius Anschuetz, St. Louis, Mo.
Philip Gilstrap Bruton, Buffalo, N. Y.
Ira Leonard Collier, Seattle, Wash.
Harold Bernard Hammill, Berkeley, Cal.

MAURICE WILLIAM HEWETT, Minneapolis, Minn.
JOHN JAMES HURLEY, Dayton, Ohio
DAVID HOWE LUCCHESI, JR., Baltimore, Md.
JOHN SIEMON MEANS, Denver, Colo.
GEORGE JOHN MEISE, New York City
MELVIN LYMAN MOONE, Lansing, Mich.
CHELIUS HAZEL SHEA, Piqua, Ohio
WILLIAM DAVIS SHIPMAN, Chicago, Ill.
CHARLES SMITH WHITNEY, Milwaukee, Wis.

The Acting Secretary announced the following deaths:

JOHN ABIEL ATWOOD, of Pittsburgh, Pa., elected member, January 3d, 1900; died February 29th, 1920.

GEORGE BARKER BURBANK, of New York City, elected Member, July 4th, 1888; died February 29th, 1920.

ANDREW CHRISTIAN HANSEN, of Los Angeles, Cal., elected Member, October 4th, 1910; died February 9th, 1920.

ORLANDO WHITNEY NORCROSS, of Worcester, Mass., elected Member, October 31st, 1911; died February 27th, 1920.

Adjourned.

April 7th, 1920.—The meeting was called to order at 8.30 P. M.; Vice-President Herbert S. Crocker in the chair and acting as Secretary; and present, also, 85 members and guests.

The minutes of the Annual Meeting, January 21st, 1920, and of the meetings of February 4th, February 18th, and March 3d, 1920, were approved as printed in *Proceedings* for February and March, 1920.

A paper by Herbert C. Keith, M. Am. Soc. C. E., entitled "A Novel Method of Repairing a Swing Bridge", illustrated with lantern slides, was presented by the author and his son, G. M. Keith, Jun. Am. Soc. C. E. The subject was discussed by Messrs. J. B. French, T. Kennard Thomson, Guy Pinner, Charles Rufus Harte, T. Hugh Boorman, O. E. Hovey, Frank W. Skinner, Theodore Belzner, Shortridge Hardesty, and Arthur S. Tuttle.

The Acting Secretary announced the following deaths:

FREDERICK THOMAS HATCH, of St. Louis, Mo., elected Member, December 4th, 1889; died March 9th, 1920.

GEORGE BLAGDEN HAZLEHURST, of Cantonsville, Md., elected Member, February 1st, 1888; died May 27th, 1919.

ALFRED RAYMOND, of New Orleans, La., elected Member, September 6th, 1910; died January 13th, 1920.

ELLIS DUNN THOMPSON, of Philadelphia, Pa., elected Member, February 1st, 1899; died February 9th, 1920.

GEORGE WELLMAN PARSONS, of Steelton, Pa., elected Associate, September 3d, 1884; died August 15th, 1919.

Adjourned.

ITEMS OF INTEREST

The Committee on Publications will be glad to receive communications of general interest to the Society, and will consider them for publication in *Proceedings* in "Items of Interest". This is intended to cover letters or suggestions from our membership concerning matters which are not of a technical character. Such communications, however, must not be controversial or commercial.

NATIONAL SERVICE DEPARTMENT OF ENGINEERING COUNCIL

In response to frequent expression of need, Engineering Council announces the establishment of a National Legislative and Departmental Information Service for engineers in all branches of the Profession. Information relative to engineering statistics, research, and construction, as well as of matters before Congress involving engineering considerations, will be furnished without charge by addressing M. O. Leighton, National Service Representative of Engineering Council, 502 McLachlen Building, Washington, D. C. This National Service Department of Engineering Council announces that its office at Washington is open to members of the Society at all times, and that accommodations can be had there at short notice for committee meetings of the Society, or of any organization in which the Society is interested, which may be held in Washington.

Charles F. Rand Elected Chairman of Engineering Foundation Board

At a special meeting of the Engineering Foundation Board on March 12th, 1920, the resignation of Dr. W. F. M. Goss as Chairman of the Board, dated February 14th, was accepted with regret and appreciation of his able services. On nomination of the Executive Committee, Charles F. Rand, who was President of the United Engineering Society for four years up to last January,* was elected Chairman for the term ending in February, 1921.

Information Bureau and Memorials for Engineering Societies Building

After consideration of a letter from John P. Hogan, M. Am. Soc. C. E., proposing a memorial tablet to the 11th Engineers, and a letter by Secretary Alfred D. Flinn, M. Am. Soc. C. E., to the Committee on War Memorials in regard to a permanent exhibition of flags of selected engineer regiments, it was voted at the regular meeting of the Trustees of United Engineering Society on March 25th, 1920,

* See *Proceedings*, Am. Soc. C. E., March, 1920, p. 335.

that the President should appoint a Committee to report upon: (1) the establishment of a general information bureau and reading room; (2) furnishing of the Entrance Hall, and (3) war and other memorials. The following were appointed to act on this Committee:

E. Gybbon Spilsbury, M. Am. Soc. C. E., Chairman; Clemens Herschel, Past-President, Am. Soc. C. E.; Calvert Townley, and J. V. W. Reynders, M. Am. Soc. C. E.

ACTIVITIES OF ENGINEERING COUNCIL

Board for Jurisdictional Awards in the Building Industry

Rudolph P. Miller, M. Am. Soc. C. E., representing Engineering Council on the Board for Jurisdictional Awards in the Building Industry, reports that the work of this Board is proceeding most satisfactorily, and that there is a feeling, particularly among the labor unions, that its work will be very helpful in adjusting difficulties which lead to strikes. One labor representative stated at the meeting held in Washington, D. C., March 8th to 11th, 1920, that the Board had accomplished in a few days what the contending organizations had failed to do in some years. At this meeting there were present: E. J. Russell, American Institute of Architects; Rudolph P. Miller, Engineering Council; J. R. Wiggins, Associated General Contractors; F. J. C. Dresser, Associated General Contractors; E. M. Craig, National Association of Building Trades Employers; Thomas Preece, John T. Cosgrove, and John H. Hynes, Building Trades Department, American Federation of Labor. The following controversies between international unions were considered and disposed of:

1.—Controversy between the Amalgamated Sheet Metal Workers' International Alliance and the United Association of Plumbers, Steam Fitters, and Steam Fitters' Helpers, concerning air washers, fans, blowers, the housing of same, and the pipe fitting on same. An agreement between the two contending organizations was submitted, which agreement was confirmed by the Board.

2.—Controversy between the United Association of Plumbers, Steam Fitters, and Steam Fitters' Helpers, and the International Union of Steam Engineers, on the question of maintaining temporary heat while structures are in course of construction. Argument was heard on both sides, and jurisdiction was given to the steam fitters "until the initial test is completed, immediately after which time, whenever necessary to maintain heat a stationary engineer (union of Steam Engineers) shall be employed".

3.—Controversy between the Bridge and Structural Iron Workers' International Association and the United Association of Plumbers and Steam Fitters, as to the installation of threaded pipe. After hearing

argument, it was decided that "Pipe railing consisting of standard sized, cut and threaded pipe, not used in connection with structural or ornamental iron work, is awarded to the United Association of Plumbers and Steam Fitters".

4.—Controversy between Operative Plasterers and Cement Finishers' International Association and the Wood, Wire and Metal Lathers' International Union, on the question of the placing of corner beads. After hearing argument, it was decided that "the adherence of corner beads by plastic material" technically known as "sticking", belongs to the plasterers.

5.—Controversy between the Amalgamated Sheet Metal Workers' International Association and the Brotherhood of Painters and Decorators, as to the glazing of sheet metal sash frames, doors or skylights. An agreement made between these contending organizations on this subject was submitted, and the matter was accordingly dismissed.

6.—Controversy between the Bridge and Structural Iron Workers' International Association and the Wood, Wire and Metal Lathers' International Union, on the placing of reinforcement for reinforced concrete, cement and floor construction. After hearing argument, it was decided "that all iron and steel used for reinforcement in reinforced concrete, cement and floor construction" should be awarded to the iron workers. It was, however, to be understood that in such cities or localities where there are existing agreements between employers and the lathers' union, such agreements should continue in force until their expiration under the terms of the agreement, after which the decision made shall prevail.

7.—Controversy between the International Brotherhood of Electrical Workers and the Elevator Constructors' International Union, on the matter of electrical work in connection with elevators. After discussion, it was decided that the electrical work of flash lights, electrical annunciators and lamps and feed wires, remain, as heretofore, in the control of the electrical workers. Other electrical work is to be done by the elevator constructors.

8.—Controversy between the Bricklayers, Masons and Plasterers' International Union and the Brotherhood of Painters, Decorators and Paper Hangers, as to the setting of vitrolite and other opaque glass. After hearing argument, it was decided that "Jurisdiction over the setting of vitrolite and similar opaque glass, is awarded to the Bricklayers, Masons and Plasterers' International Union."

9.—Controversy between the Bricklayers, Masons and Plasterers' International Union and the International Brotherhood of Electrical Workers, with respect to the cutting of chases or channels in masonry. After hearing argument, it was decided that when channels do not exceed 2 by 2 in. in size, or do not require labor exceeding 8 hours continuous work, it may be done by the electrical workers. Other

channels, chases, or grooves in masonry of all kinds, necessary to the installation of electrical work, must be done by the bricklayers. It was to be understood, however, that this decision does not contemplate the channelling or cutting of granite or hard stone.

10.—Controversy between the Bricklayers, Masons and Plasterers' International Union and the Bridge and Structural Iron Workers' International Association, over the erection and operation of stone derricks. Inasmuch as the representatives of the two unions stated that an effort was being made to adjust this between them, and that the prospect of such adjustment was good, the matter was dismissed from further consideration by the Board.

11.—Controversy between the International Association of Amalgamated Sheet Metal Workers and the Bridge and Structural Iron Workers' International Association, over the erection of corrugated sheeting. The representatives of the two organizations stated that they were then conferring on this matter, and requested permission to adjust the matter outside of the Board. In view of this statement, the matter was dismissed.

American Railway Engineering Association Elected a Member of Engineering Council

In accordance with the proposal of Chairman J. Parke Channing in a communication to the United Engineering Society dated March 19th, 1920, and the unanimous approval of the representatives of the Founder Societies in Engineering Council, it was voted at the regular meeting of the Trustees of United Engineering Society on March 25th, 1920, as follows:

"That the American Railway Engineering Association be invited and elected to membership in Engineering Council, subject to the unanimous approval of the governing bodies of the four Founder Societies, and that upon receipt by the Secretary of information of such approval, the invitation be extended to said Association to become a member of Engineering Council, upon acceptance of the invitation and compliance with the requirements of the Rules for Admission of Additional Societies".

The American Railway Engineering and Maintenance of Way Association was organized in 1899 with the object of "the advancement of knowledge pertaining to the scientific and economical location, construction, operation and maintenance of railroads"; the name was changed in 1911 to its present form and the Association now has about 1 640 members. The President is H. R. Safford, M. Am. Soc. C. E., Assistant to President, Chicago, Burlington and Quincy Railroad, and the Secretary is E. H. Fritch, 431 South Dearborn Street, Chicago, Ill.

John Fritz Medal to be Presented to Orville Wright on May 7th

The John Fritz Medal for 1920 has been awarded to Orville Wright, Esq., for achievement in the development of the airplane. At a meeting in the auditorium of the Engineering Societies Building on May 7th, 1920, at 8.30 P. M., at which the principal speakers will be Gen. George O. Squier, Chief Signal Officer, and Col. Edward A. Deeds, of Dayton, Ohio, formerly of the Aircraft Production Board, the presentation will be made by Prof. Comfort A. Adams. Mr. B. B. Thayer, present chairman of the John Fritz Medal Board of Award, will preside. A cordial invitation to attend is extended to all members of the Society.

The previous recipients of this medal have been:

John Fritz	1902
Lord Kelvin	1905
George Westinghouse	1906
Alexander Graham Bell	1907
Thomas Alva Edison	1908
Charles Talbot Porter	1909
Alfred Noble	1910
Sir William Henry White	1911
Robert Woolston Hunt	1912
John Edson Sweet	1914
James Douglas	1915
Elihu Thomson	1916
Henry Marion Howe	1917
J. Waldo Smith	1918
George W. Goethals	1919

American Engineering Standards Committee

At a meeting of the American Engineering Standards Committee on March 6th, 1920, it was voted to grant Secretary P. G. Agnew leave of absence in order to attend the meeting of the International Electrotechnical Commission in Brussels, Belgium. Dr. Agnew left on March 13th, 1920, expecting to be abroad about six weeks, and to spend some time in London and Paris studying British and French standardization organizations. Dr. J. F. Meyer, of the United States Bureau of Standards, was given charge of the office during Dr. Agnew's absence.

Mr. R. B. Woodworth, of the Association of American Steel Manufacturers, was elected permanent chairman of the Sectional Committee on Steel Shapes, for which the Society is one of the sponsor bodies, President A. P. Davis having appointed H. G. Balcom, J. H. Edwards and J. B. French, Members Am. Soc. C. E., as its representatives on said Sectional Committee. This Committee has approved the use of

two-place decimals of an inch in the determination of profiles of structural shapes; has adopted the recommendation of the Association of American Steel Manufacturers that practical, definite ranges of thickness and weights per foot for each shape be used in accordance with American standard practice; has voted that the gradations in range of thickness be expressed in multiples of 0.04 in., and that there should be but one line of channel sections for both structural and shipbuilding uses.

Five standards have been submitted by the American Society for Testing Materials for the approval of the American Engineering Standards Committee as follows: Specifications for Drain Tile; Test for Toughness of Rock; Test for Penetration of Bituminous Materials; Test for Distillation of Bituminous Materials Suitable for Road Treatment, and Method for Sampling Coal. A Committee consisting of George E. Thackray, M. Am. Soc. C. E., Chairman, Fred E. Rogers, and Martin Schreiber, M. Am. Soc. C. E., was appointed to consider these standards, and it is expected that action will be taken upon its recommendation at the next meeting of the Standards Committee on June 5th, 1920.

The Tunnel Under the English Channel

The project of tunneling the English Channel dates back to about 1802, when an engineer named Mathieu submitted a scheme to Bonaparte, and it has been presented repeatedly to the British and French Governments. Prior to the European war the main objection which prevented procedure with the work was the fear on the part of the military authorities in Great Britain that it would destroy the protection which the Channel gave to the British Isles. This condition has been totally changed by the War and by the development of the navigation of the air, and it is understood that the British military and naval authorities now favor the project, provided the English end is controlled by these British authorities.

As to the geological conditions which govern the situation, it may be said that what is now the English Channel was probably caused by a gradual subsidence of the land and not by any violent cataclysm, consequently there is every reason to believe that the stratification continues intact and uniform from the southerly counties of England across the Channel and through the northern region of France.

In the first scheme, proposed by Mathieu, the tunnel was divided into two parts, each part being about 10 miles long and each opening on to a submarine bank situated nearly in the centre of the Dover Straits. This submarine bank was to be raised and formed into a large island, and on this artificial island a town was to be erected, together with a large harbor. This scheme was not based on any really serious study, and of course brought no result.

During 1882 and 1883 considerable lengths of experimental sections of tunnel were built from the French and British shores. It is proposed to continue the construction of the tunnel throughout as planned at that time, placing it about 180 ft. below the level of the sea in a stratum of gray chalk, which is about 200 ft. thick and which it is believed is impervious to water, and so far as geological investigation can show free from faults and fissures. The shores on the French and British sides of the Channel are fronted with high chalk cliffs and it is necessary to extend the tunnel a long distance back of the cliffs on either side before the tracks can be brought to the surface of the land and connected with the main line railroads. The total length of the tunnel from surface to surface would be approximately 32 miles, whereas the length under the Channel would be about 23 miles.

The present plans, as now developed, contemplate two twin bores lined with reinforced concrete. Each tunnel would take one line of track and would be about 20 ft. in external diameter, 18 ft. in internal diameter, lined with reinforced concrete and driven by the aid of mechanical excavators by which a high rate of progress can be attained in this chalk.

Had this tunnel been in existence during the World War, enormous sums of money would have been saved to the Allies and greatly increased efficiency would have been obtained in the handling of troops and supplies. The dire necessity for better communication between Great Britain and the European continent was met by the establishment by the British Government of lines of train ferries between Richborough and Dunkirk, Richborough and Calais, and Southampton and Dieppe. A line between Southampton and Cherbourg is also being started. The boats used have a length of 363 ft., beam 61½ ft., draft 12 ft., displacement of 3 650 tons, and a speed of 12 knots. They have four rail tracks and carry fifty-four 10-ton railroad cars.

The tunnel necessitates the installation of electric power for operation. Had the tunnel been built 40 or 50 years ago when active efforts were being made to push the project for adoption, the railroad probably would never have been operated on account of the difficulties of ventilation, with the motive power then available. The development of electric power for operation has revolutionized the entire situation and apparently there is no longer any objection from the military point of view to carrying out the project.

It is estimated in a recent article in the *London Times* that the tunnel, by the use of all modern mechanical appliances, could be driven in four years exclusive of lining and equipment.

An initial service of 15 passenger trains per day in each direction would provide for some 1 500 000 passengers per annum; as the traffic grew more trains could be provided. There would be sufficient periods of the day left in which the freight traffic could be taken care of, either

during such times as the passenger trains were not running, or sandwiched in between. This tunnel would provide rail connection between England and the Continent, not merely with France, but with the entire European system of railroads, the gauge of which is practically the same as in England.

There appears to be absolutely no engineering or physical reasons why there should be any doubt about the success of the undertaking, and while there might be a few years at the start of operation during which there would be a deficit, this could be taken care of by some form of guarantee by the British, French, and Belgian Governments; and now that political and military obstacles seem to have been removed, a short time should see the inception of this long-delayed and much-needed connection.

The "Military Engineer", Successor to "Professional Memoirs"

Aiming to enter a larger field and operate on a broader basis than its predecessor *Professional Memoirs,* and to form a bond of union between all members of the Engineering Profession who are interested in the National defense, *The Military Engineer* has just been issued as the journal of the Society of American Military Engineers. It is published bi-monthly at Washington Barracks, D. C.

EUROPEAN NOTES

The following notes relative to reconstruction, etc., in Belgium and France, and industrial progress, etc., in Great Britain and elsewhere, have been contributed by W. E. Woolley, Assoc. M. Am. Soc. C. E., of London, England, who is also a Corresponding Member of the Association of Liége (Belgium) Architects.

Liége Council Votes Credits for House Construction

The town council of Liége has voted a credit of 5 000 000 francs for the construction of working class dwellings, for the purchase and fitting up of existing house property, also for the construction of temporary dwellings. It has also decided to create a letting agency.

An exhibition is to be held shortly at the Museum, Rue de l'Academie, Liége, of the designs awarded premiums in the recent competition organized by the High Commissioner for the devastated regions of Liége, Namur, and Luxemburg.

Industrial Research in Belgium

The Office of Industrial Research in Belgium, which is under the Ministry of Economic Affairs, is studying problems which are of great importance to Belgium at the present time, such as economies effected

in fuel by electrification, and the manufacture of ammonia compounds and nitrates, in order to diminish imports of these. It is proposed to establish a laboratory for research and study of materials of construction, of industrial products, etc., to aid and encourage inventors, and to co-operate with foreign or international organizations having the same objects.

The American Monument on the Marne

The *Petit Parisien* announces that the American monument on the Marne will shortly be erected on a site chosen by Marshals Joffre and Foch.

The monument will be a replica of the Statue of Liberty in New York Harbour, and will probably be unveiled on July 4th, American Independence Day, or July 14th, the French Fête Nationale.

Turf as Engine Fuel

The Swedish Department of Railways has announced that it intends to develop the production of turf fuel for locomotive firing.

The experiment with turf as railway fuel began in 1917, and in the following year turf was being cut in eleven different districts, and the production reached 40 000 tons. Last year turf was in widespread use both in stationary engines and in locomotives. Experience showed that it was fully suitable for slow freight trains and for shunting locomotives, but was less suitable for fast passenger trains.

Economically considered, turf is more profitable than coal at present high prices for the latter.

BRIEF NOTES

Secretary of War Baker, after an inspection of the Rock Island Arsenal, is reported as enthusiastic over the plan of employees representation which is there in force, by which a committee composed of three representatives elected from each department takes up all grievances and gives the men a direct voice in the management of the Arsenal.

According to an announcement by the Inter-racial Council, of New York City, 275 000 emigrants have left this country since the armistice, taking $550 000 000 with them, while during the same period immigration has consisted largely of war widows, and other women or industrial non-producers.

By using Hertzian waves, wireless experts of the British fleet have succeeded in controlling torpedo craft from a distance of some miles.

Negotiations with Great Britain are under way in Brussels for a loan of £5 000 000 to be used for reconstruction of the devastated districts of Belgium.

According to official statistics of the American Iron and Steel Institute, 1919 pig iron production in the United States was 31 015 364 tons, as compared with 39 054 644 tons the preceding year. The output in 1917 was 38 021 216 tons, and in 1916, 39 434 797 tons, the production in 1916 being the largest of any year in the history of the industry. The annual report of the U. S. Steel Corporation shows earnings for 1919 of $152 290 639, a decrease of $55 990 465 as compared with 1918.

Lt.-Col. K. Mixer, Red Cross Commissioner to France, states that the return to normal conditions in France is going on so rapidly that 4 300 000 inhabitants of the 4 700 000 who in pre-war days occupied the devastated areas have returned to their homes and will have the region under cultivation within a year. Col. Mixer announces that similar progress is being made in Belgium.

It is announced in London that steps have been taken for the formation of the most powerful banking combine in the history of peace-time finance for restoring industry and economic life of central Europe. Participants in the organization are Lloyds Bank, London Joint City and Midlands Bank, Frederick Huth and Co., Morgan, Grenfell and Co., Coschen and Cunliffe, Rothschild and Sons and Schroeder and Co. It is said to be a practicable scientific scheme along the lines of a semi-barter system by which raw materials will be allowed to flow into central Europe.

ANNOUNCEMENTS

The Reading Room of the Society is open from 9 A. M. to 10 P. M., every day, except Sundays, New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, and Christmas Day; during July and August, it is closed at 6 P. M.

FUTURE MEETINGS

May 5th, 1920.—8.30 P. M.—A regular business meeting will be held, and a paper by Allen Hazen, M. Am. Soc. C. E., entitled "Hydraulic-Fill Dams", will be presented for discussion.

This paper is printed in this number of *Proceedings*.

May 19th, 1920.—8.30 P. M.—The usual meeting will be held on this evening, and announcement of the programme will be made later.

ENGINEERING SOCIETIES EMPLOYMENT BUREAU

Engineering Societies Employment Bureau, established December 1st, 1918, as an activity of Engineering Council, is managed by a board made up of the Secretaries of the four Founder Societies, funds for its maintenance being provided by these Societies. The Bureau is co-operating with engineering organizations in all parts of the country and with the Re-employment Bureau under the auspices of the American Legion. It is desirous of increasing such co-operation by working with local engineering associations and clubs. The work of the Bureau since its inception has been largely in the line of securing employment for men retiring from government war service. Members of the American Society of Civil Engineers who desire to register with this Bureau should apply for further information, registration forms, etc., to Walter V. Brown, Manager, Engineering Societies Employment Bureau, First Floor, Engineering Societies Building, 29 West 39th Street, New York City.

SEARCHES IN THE LIBRARY

As the Library of the American Society of Civil Engineers has been merged in the Engineering Societies Library, requests for searches, copies, translations, etc., should be addressed to the Director, Engineering Societies Library, 29 West 39th Street, New York City, who will gladly give information concerning the charges for the various kinds of service. A more comprehensive statement in regard to this matter will be found on page 21 of the Year Book for 1920.

PAPERS AND DISCUSSIONS

Members and others who take part in the oral discussions of the papers presented are urged to revise their remarks promptly. Written

communications from those who cannot attend the meetings should be sent in at the earliest possible date after the issue of a paper in *Proceedings*.

All papers accepted by the Publication Committee are classified by the Committee with respect to their availability for discussion at meetings.

Papers which, from their general nature, appear to be of a character suitable for oral discussion will be published as heretofore in *Proceedings*, and set down for presentation to a future meeting of the Society, and, on these, oral discussion, as well as written communications, will be solicited.

All papers which do not come under this heading, that is to say, those which from their mathematical or technical nature, in the opinion of the Committee, are not adapted to oral discussion, will not be scheduled for presentation to any meeting. Such papers will be published in *Proceedings* in the same manner as those which are to be presented at meetings, but written discussions only will be requested for subsequent publication in *Proceedings* and with the paper in the volumes of *Transactions*.

The Board of Direction has adopted rules for the preparation and presentation of papers, which will be found on page 35 of the Year Book for 1920.

LOCAL ASSOCIATIONS OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

San Francisco Association, Organized 1905.

M. M. O'Shaughnessy, President; Nathan A. Bowers, Secretary-Treasurer, 502 Rialto Building, San Francisco, Cal.

The San Francisco Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet, and weekly informal luncheons. The former are held at 6 P. M., at the Engineers' Club, 57 Post Street, on the third Tuesday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at noon, every Wednesday, at the Engineers' Club, where special tables are reserved for members and guests of the Association.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in San Francisco, and any such member will be gladly welcomed as a guest.

Colorado Association, Organized 1908.

W. C. Huntington, President; A. N. Miller, Secretary-Treasurer, 1400 West Colfax Avenue, Denver, Colo.

The meetings of the Colorado Association of Members of the American Society of Civil Engineers (Denver, Colo.) are held on the second Saturday of each month, except July and August. The hour and place

of meeting are not fixed, but this information will be furnished on application to the Secretary. The meetings are usually preceded by an informal dinner. Members of the American Society of Civil Engineers will be welcomed at these meetings.

Weekly luncheons are held on Wednesday, at 12.30 P. M., at Daniels and Fisher's.

Visiting members are urged to attend the meetings and luncheons.

(Abstract of Minutes of Meetings)

December 13th, 1919.—The meeting was called to order at the Shirley Hotel; Vice-President Oliver T. Reedy in the chair; A. N. Miller, Secretary; and present, also, 11 members and 1 guest.

The minutes of the previous meeting were read and approved.

On motion, duly seconded, it was voted that the Chair appoint a committee to prepare a memoir of the late Thomas W. Jaycox, M. Am. Soc. C. E., and Mr. Lyman E. Bishop was appointed as such committee.

Mr. Arthur Ridgway, the Association's representative in the Colorado Engineering Council, called attention to the fact that the terms of office of the representatives in the Council expired on January 1st, 1920, and, on motion, duly seconded, it was voted to reinstate the present incumbents, namely, Mr. Ridgway as representative and Mr. E. F. Vincent as alternative.

Capt. H. G. Burrowes addressed the meeting on "The Work of the Engineer Regiments in France", and Maj. W. B. Freeman described the work of the 509th Engineers and discussed briefly the character and relative efficiency of the common labor with which he had come in contact in France.

Adjourned.

January 10th, 1920.—The meeting was called to order at Baur's Café; Vice-President Oliver T. Reedy in the chair; A. N. Miller, Secretary; and present, also, 10 members and 1 guest.

The Secretary read a letter from the Philadelphia Association requesting favorable action on the report of the Development Committee. He also read a letter from the Northwestern Association outlining the action of its members relative to the report.

On motion, duly seconded, it was decided that no action would be taken on these letters until after Mr. Thomas L. Wilkinson had addressed the meeting on the subject.

Mr. L. R. Hinman reported in the matter of tunneling the Continental Divide and stated that, owing to certain difficulties in the way of getting together, he doubted the feasibility of further work by the Committee. The Chairman, however, suggested that the work of the Committee be continued.

Mr. Wilkinson addressed the meeting on the report of the Development Committee, after which, on motion, duly seconded, the following resolutions were adopted:

"That this Section endorses the action of the Committee on Development of the American Society of Civil Engineers and favors the adoption of its report as a whole and its present form.

"That a copy of the above resolution be sent to the Board of Direction, to the Committee of the Board of Direction to Review the

Report of the Committee on Development, and to Mr. George G. Anderson with the request that he act as the representative of the Association at the Annual Meeting."

Adjourned.

February 14th, 1920.—The meeting was called to order in the dining-room of the Union Station; President W. C. Huntington in the chair; Vice-President O. T. Reedy acting as Secretary; and present, also, 13 members and 4 guests.

An informal discussion of the Federal Aid Road Work was opened by Mr. A. E. Palen, Senior Highway Engineer of the Bureau of Public Roads.

Mr. L. R. Hinman, Chairman of the Committee appointed to investigate the matter of securing data in connection with the proposed tunnel through the Continental Divide, presented a report of that Committee.

On motion, duly seconded, the report was accepted and the Committee discharged, after which there was a lengthy discussion of the subject.

(President Huntington being obliged to leave, the meeting called Vice-President Reedy to the chair.)

Mr. Arthur Ridgway, President of the Local Engineering Council, called the attention of the members present to the matter of response to calls for individual contributions for the support of National Engineering Council and of the suggested unification of the engineering works of the State along lines similar to the proposed Federal Department of Public Works.

The Secretary read a communication from the Secretary of the Joint Council of Engineering Societies of San Francisco, calling attention to an enclosed set of resolutions endorsing Herbert C. Hoover, M. Am. Soc. C. E., for President, and inviting engineering bodies of the United States to join with it in furthering Mr. Hoover's nomination and election.

Mr. F. E. Weymouth called attention to the provision of the Esch Water Power Bill to detail an Army Officer as Executive Secretary and Engineer Officer of the proposed Water Power Commission. After considerable discussion of the subject it was decided, on motion, duly seconded, that a committee of three be appointed to secure all the data possible in regard to this matter to be presented to a called meeting of the Association, in order that the question of protesting this provision might be discussed. The Chairman appointed Messrs. Weymouth, Ridgway, and Hinman as such Committee.

Adjourned.

February 18th, 1920.—The Special Meeting was called to order at Daniels and Fisher's Tea Room; Vice-President O. T. Reedy in the chair; A. E. Palen, acting as Secretary; and present, also, 16 members and 1 guest.

The special meeting was called by the Executive Committee for the purpose of receiving and considering the report of the Committee appointed to secure certain data in regard to the Esch Water Power Bill now before Congress, and was held in connection with the regular weekly luncheon of the Association.

Mr. F. E. Weymouth, Chairman, presented the report of the Committee, and the subject was discussed by those present.

On motion, duly seconded, the following resolutions were adopted:

"*Whereas,* Section 2 of the Water Power Bill, H. R. 3184, as amended, provides for the appointment of an officer of the Engineer Corps of the Army as Executive Secretary and Engineer Officer of the Commission, and

"*Whereas,* The justification of such designation is based upon erroneous reasoning because, first: no ultimate economy would actually result therefrom, for if the duties of such officer of the Engineer Corps were essential, and the presumption is that they are essential or otherwise there would be no such officer in the Engineer Corps, then some other person must of necessity be designated to succeed the Engineer Corps Officer detailed to the work of the Commission; second: the permissible period of detachment of Army Officers from their regular duties would in no wise insure tenure of office as Executive Secretary and Engineer Officer of the Commission than a civilian incumbent thereof; and third: it can by no means be maintained as an established fact that officers of the Army Engineer Corps possess more of the necessary qualifications, either through training or experience in water power matters, than civilian engineers, and

"*Whereas,* We believe it in the interest of the people to leave to the discretion of the Commission the appointment of an Executive Secretary and Engineer Officer to the end that the highest qualifications may govern, regardless of whether those qualifications are to be found in the personnel of the Army or in civil life;

"*Now, Therefore, Be it Resolved* by the Colorado Association of Members of the American Society of Civil Engineers that the first sentence of Section 2 of the Water Power Bill, H. R. 3184, be struck out and the following sentence be substituted therefor:

"'That the Commission shall appoint, fix the compensation and prescribe the duties of an Executive Secretary and Engineer Officer who shall be a properly qualified Engineer', and

"*Be it Further Resolved* That a counterpart of these resolutions be transmitted forthwith to each of the Congressional Senators and Representatives of the State of Colorado."

On motion, duly seconded, it was voted to send a copy of these resolutions to the Chairman of the Joint Conference Committee considering the bill. It was also decided to furnish the *Rocky Mountain News* with a report of the meeting and advise the other engineering societies of Denver of the action of the Association, with the request that they take similar action.

Adjourned.

Atlanta Association, Organized 1912.

V. H. Kriegshaber, President; Howard L. Stillwell, Secretary-Treasurer, 533 Trust Co. of Georgia Bldg., Care, Southeastern Underwriters' Association, Atlanta, Ga.

Informal luncheons are held for members of the Association on the last Monday of each month, at 12.30 P. M., to which visiting members

of the American Society of Civil Engineers will be welcomed. The place is not fixed, but this information will be furnished on application to the Secretary.

Baltimore Association, Organized 1914.

H. G. Perring, President, 3206 Carlisle Avenue, Baltimore, Md.

Cleveland Association, Organized 1914.

W. P. Brown, President; George H. Tinker, Secretary-Treasurer, 516 Columbia Building, Cleveland, Ohio.

The regular meetings of the Association are held on the second Wednesday of each month, at 12.15 P. M., in the Rooms of the Electrical League, on the Fourteenth Floor of the Statler Hotel. Luncheon is served at these meetings, and visiting members are invited to attend.

Connecticut Association, Organized 1919.

C. M. Saville, President; R. J. Ross, Secretary, Municipal Building, Hartford, Conn.

The Annual Meeting of the Association is held in April. The Association also holds fortnightly meetings alternating between Hartford and New Haven, Conn. These meetings are informal luncheon gatherings held usually at noon on Saturday, a notice being mailed to each member calling attention to the date, time, place, and subject for discussion. Members are privileged to invite guests regardless of their affiliation as engineers. No set speeches are scheduled, but certain members are asked to be prepared to present the assigned subject and lead in a general discussion.

Detroit Association, Organized 1916.

Lewis M. Gram, President; Dalton R. Wells, Secretary-Treasurer, 624 McKerchey Building, Detroit, Mich.

The regular meetings of the Association are held on the second Friday of December, April, and October, the last being the Annual Meeting.

District of Columbia Association, Organized 1916.

David S. Carll, President; James H. Van Wagenen, Secretary-Treasurer, 719 Fifteenth Street, N. W., Washington, D. C.

Duluth Association, Organized 1917.

G. A. Taylor, President; Walter G. Zimmermann, Secretary, Wolvin Building, Duluth, Minn.

The regular meetings of the Association are held at noon on the third Monday of each month (usually at the Kitchi Gammi Club), with luncheon, followed by a short business session and the reading of papers. Visiting members of the American Society of Civil Engineers can secure from the Secretary definite information relative to the meetings, at which they will be welcomed. The Annual Meeting is held on the third Monday in May.

Illinois Association, Organized 1916.

A. F. Reichmann, President; W. D. Gerber, Secretary-Treasurer, 913 Chamber of Commerce, Chicago, Ill.

The regular meetings of the Association are held on the second Monday of March, June, September, and December, the last being the Annual Meeting. The hour and place of meetings are not fixed, but this information will be furnished on application to the Secretary.

Iowa Association, Organized 1920.

J. E. Van Liew, President; R. W. Crum, Secretary, Iowa State College, Ames, Iowa.

(Abstract of Minutes of Meetings)

November 20th, 1919.—The meeting was called to order, at Des Moines, Iowa; President J. E. Van Liew in the chair; R. W. Crum, Secretary; and present, also, 16 members and 3 guests.

Papers by Messrs. J. H. Dunlap and W. J. Schlick on "Organization of Engineers in Iowa" and "An Outline Plan of Organization for the Engineering Council of Iowa", respectively, were presented by the authors, and were followed by a general discussion of the subject.

On motion, duly seconded, the following resolution was adopted:

"That a Committee, consisting of Messrs. J. E. Van Liew, C. H. Currie, J. H. Dunlap, and W. J. Schlick, be appointed to confer with representatives from other sections of National societies and local engineering clubs and State Engineering organizations, concerning State-wide co-operation and to report at the next meeting."

On motion, duly seconded, it was decided that the Association go on record as favoring an all-State engineering organization.

A paper entitled "Family Relations", by Mr. W. G. Raymond, was presented by the author, and, after further discussion of the subject, it was decided, on motion, duly seconded, that the recommendations of the Seattle Association and the general problems involved therein be referred to the Executive Committee for report at the next meeting.

On motion, duly seconded, it was decided that the next meeting of the Association be held in connection with the Annual Meeting of the Iowa Engineering Society.

It was also decided, on motion, duly seconded, that the officers serving at this time be considered as *pro tem.*

The following officers were elected: President, J. E. Van Liew; Vice-President, C. H. Currie; and Directors, C. L. Huff and J. B. Marsh.

On motion, duly seconded, the dues for 1920 were fixed at $5 00.

On motion, duly seconded, the following amendment to the By-Laws was ordered sent to letter-ballot to the members of the Association:

"Article VII.—All members of the American Society of Civil Engineers exempt from payment of dues in that Society be exempt from payment of dues in this Association."

The Secretary, on motion, duly seconded, was instructed to send copies of the papers by Messrs. Raymond, Dunlap, and Schlick to all members of the Association.

Adjourned.

February 17th, 1920.—The meeting was called to order at Fort Dodge, Iowa, at 8 P. M.; President J. E. Van Liew in the chair; R. W. Crum, Secretary; and present, also, 19 members and 4 guests.

The minutes of the First Annual Meeting, held in Des Moines, Iowa, on November 20th, 1919, were read and approved.

The report of the Special Committee on Co-operation of Engineering Societies and Clubs in Iowa was presented by Mr. J. H. Dunlap, in the form of minutes of a conference on affiliation of engineering clubs and societies, held on January 9th, 1920, at the call of the Committee.

On motion, duly seconded, the plan was approved in spirit and extent, the representation of the Association at the organization meeting of the Council was fixed as one delegate for each fifteen members or fraction thereof, and the changes in the plan recommended by the Committee were approved.

On motion, duly seconded, the President was instructed to appoint four representatives from the Association to the conference of delegates of the Iowa Engineering Clubs and Societies to be held on February 20th, 1920, at Fort Dodge, Iowa.

President Van Liew subsequently appointed the following members of the Association as such delegates: Messrs. W. G. Raymond, Chairman, W. J. Schlick, H. S. Williams, and C. H. Currie.

The report of the Special Committee on Relations between Local Associations and the American Society of Civil Engineers, was presented by President Van Liew.

A report on the Annual Meeting of the Society was presented by Anson Marston, Director from District No. 7.

The Secretary was instructed by President Van Liew to inquire of the Secretary of the Society if it be the wish of the Board of Direction that Local Associations take any action concerning applications for membership in the Society.

Adjourned.

Louisiana Association, Organized 1914.

A. T. Dusenbury, President; Eugene F. Deléry, Secretary, 602 Sewerage and Water Board Building, New Orleans, La.

The regular meetings of the Association are held at The Cabildo, New Orleans, La., on the first Monday of January, April, July, and October.

Nebraska Association, Organized 1917.

Clark E. Mickey, President; Homer V. Knouse, Secretary-Treasurer, 200 City Hall, Omaha, Nebr.

Regular meetings of the Association are held on the first Saturday of each month, except July and August, and at such places as may be appointed from time to time by the Executive Committee. The Annual Meeting is held in Lincoln, Nebr., on the second Friday in January.

Visiting members of the Society are especially urged to communicate with the Secretary when in the city.

New York Section, Organized 1920.

Robert Ridgway, President; Lewis D. Rights, Secretary, 256 Broadway, New York City.

The Annual Meeting is held in May. The times and places of other meetings are not fixed, but this information will be furnished on application to the Secretary.

(Abstract of Minutes of Meeting)

March 31st, 1920.—The meeting was called to order at the Engineering Societies Building, at 8.35 P. M.; President Robert Ridgway in the chair; Lewis D. Rights, Secretary; and present, also, 70 members and 39 guests.

The minutes of the meeting of February 18th, 1920, were read and approved.

The President made a statement concerning the formation of the New York Section and its aims and purposes, and the Treasurer reported the membership to be 192.

President Ridgway ann unced that the Annual Meeting of the Section would be held on May 12th, 1920, and suggested the appointment of a Nominating Committee to nominate officers for the ensuing year.

Mr. Thomas C. Desmond offered a resolution as to the method of appointing a Nominating Committee, which, after discussion and amendment by Messrs. John A. Bensel and Richard S. Buck, was adopted by the meeting.

At the call of President Ridgway for nominations, the following names were designated: Messrs. Bensel, Brown, Buck, Castle, Gilman, Holland, Lavis, Mehren, and Turner.

On motion, duly seconded, the nominations were closed, and President Ridgway appointed Messrs. C. Raymond Hulsart, William G. Grove, and J. E. Beswick as Tellers to canvass the ballots for the Nominating Committee.

Lt.-Col. George D. Snyder, of the 22d Engineers, N. G. N. Y., read a letter asking for co-operation in recruiting that organization. On motion, duly seconded, the President was instructed to appoint a committee of three to co-operate with Col. Snyder in this matter.

Arthur P. Davis, President of the Society, addressed the meeting briefly on the progress of the Society.

An informal discussion on "A Bill for Licensing Engineers in New York" was opened by Mr. Clifford M. Holland, who was followed by Messrs. John A. Bensel, representing the Albany Society of Engineers, Allen Hazen, Richard S. Buck, A. D. Flinn, T. Kennard Thomson, Fred Lavis, Frederick Wilcock, George A. Orrok, Leonard D. Smith, of the American Association of Engineers, and William G. Grove. President Ridgway presented a letter from E. P. Goodrich, M. Am. Soc. C. E., on the subject.

On motion, duly seconded, the following resolution was adopted:

"That it is the expression of opinion of this meeting that engineers should be licensed in this State."

On motion, duly seconded, a resolution was adopted instructing the President to appoint a committee of three to wait on the State Legis-

lature, to acquaint it with the fact that the Section approved Bill No. 1258, and to urge the passage of such bill. President Ridgway subsequently appointed Messrs. Bensel, Buck, and Holland as such Committee.

Mr. J. P. J. Williams outlined briefly the important points of difference between the New York bill and that suggested as a model bill by Engineering Council.

The report of the Tellers appointed to canvass the ballot for the Nominating Committee was presented, and Messrs. Holland, Turner, Mehren, Castle, and Lavis were declared elected as the Nominating Committee, the Committee to select its own Chairman. Mr. Castle requested the members of the Section to make suggestions of names for candidates for officers to the Nominating Committee.

Adjourned.

Northwestern Association, Organized 1914.

Ralph D. Thomas, President; W. N. Jones, Secretary, City Engineer's Office, City Hall, Minneapolis, Minn.

The meetings of the Association are held bi-monthly, alternating between St. Paul and Minneapolis, on the third Friday of each month. Information as to the time and place of such meetings will be furnished on application to the Secretary.

Philadelphia Association, Organized 1913.

S. M. Swaab, President; Henry T. Shelley, Secretary, 416 City Hall, Philadelphia, Pa.

The regular meetings of the Association are held at the Engineers' Club of Philadelphia, 1317 Spruce Street, on the first Monday in January, April, and October, the last being the Annual Meeting. Special meetings are also held, in order to provide an opportunity for members to take a more active part in the work of the Association.

Pittsburgh Association, Organized 1917.

Morris Knowles, President; Nathan Schein, Secretary-Treasurer, 426 City-County Building, Pittsburgh, Pa.

The Annual Meeting of the Association is held on the first Monday in October. The time and place of other meetings are not fixed, but this information will be furnished on application to the Secretary.

Portland (Ore.) Association, Organized 1913.

J. C. Stevens, President; C. P. Keyser, Secretary, 318 City Hall, Portland, Ore.

The Annual Meeting of the Association is held on the second Friday in January. Other meetings are called by the President and are usually convened on Friday evenings. The place is not fixed, but this information may be obtained on application to the Secretary. All members of the American Society of Civil Engineers are cordially invited to attend the meetings.

(Abstract of Minutes of Meeting)

March 1st, 1920.—The meeting was called to order at the University Club, at 8 P. M.; President J. C. Stevens in the chair; C. P. Keyser, Secretary; and present, also, 21 members and 2 guests.

The minutes of the Annual Meeting, January 9th, 1920, were read and approved.

President Stevens announced that the members of the Board of Direction of the Association meet regularly at lunch at the University Club on the second and fourth Mondays of each month, and invited all members of the Association to attend these luncheons and make suggestions on matters discussed by the Board. He also reviewed briefly the action taken at such meetings since the Annual Meeting.

E. B. Thomson, Chairman of the Committee on the Formation of a Local Technical Council, reported that, at a meeting of delegates on February 20th, 1920, a constitution for the Oregon Technical Council had been adopted, which he offered as a Final Report of his Committee. On motion, duly seconded, the report was adopted and the Committee discharged.

On motion, duly seconded, the Board of Direction was empowered to appoint representatives of the Association to the Oregon Technical Council.

Mr. G. C. Mason explained the objects of an Industrial Disputes Commission which has been instituted by the National Rotary Clubs and is to be made up of ten representatives from organizations of the employer and employee classes, and moved that the Association appoint a representative to serve on that Commission, which motion, having been duly seconded, was carried.

The attention of the meeting was called to reports of un-American utterances on the part of a member of the Engineering Staff of the Faculty of the Oregon Agricultural College, and led to a discussion as to how far the Society or any of its Local Associations should go in interfering with the liberties of teachers on questions of morals or politics. On motion, duly seconded, the President was instructed to appoint a committee of three to investigate the charges against the faculty member in question and report back to the Association.

Mr. Mason, as member of the Development Committee from this District, made an appeal for a full vote on the Questionnaire sent out by the Society, on the subject, and Director Henny reported on events at the Annual Meeting of the Society, supplementing Mr. Mason's appeal for a full vote on the Questionnaire as an expression of the opinion and feeling of the members of this District on the work of the Development Committee.

The Secretary read a communication from Secretary Hunt relative to local items of interest for publication in the *Proceedings* of the Society, and it was stated that such matter would emanate from the Board of Direction.

Mr. Henny reported that he had interviewed all the Senators and Representatives from Oregon in regard to the Jones-Reavis Bill and that all of them were in favor of it.

Mr. J. P. Newell, President of the City Planning Commission, then addressed the meeting on "Zoning as Worked Out for the City of

Portland, and the Pending Zoning Ordinance". It was moved that the Association go on record as favoring the Zoning Ordinance as it stands and urge its immediate passage on the City Council, and the Chairman appointed Messrs. Dieck and Reed as a committee to draft a resolution to the Mayor and City Council embodying this motion.

Adjourned.

St. Louis Association, Organized 1888 (Constitution Approved by Board, 1914).

Edward E. Wall, President; C. W. S. Sammelman, Secretary-Treasurer, 300 City Hall, St. Louis, Mo.

The Annual Meeting of the Association, for the election of officers and for the transaction of business, is held on the fourth Monday in November. Two meetings each year, for the presentation and discussion of technical papers, are held in the Auditorium of the Engineers' Club of St. Louis and are open to members of the Associated Societies. Other "get-together" meetings are held regularly for dinner or luncheon on the fourth Monday of each month except July, August, and November.

San Diego Association, Organized 1915.

W. C. Earle, President; R. C. Wueste, Secretary-Treasurer, Bonita, Cal.

Seattle Association, Organized 1913.

John L. Hall, President; Bertram D. Dean, Secretary, 1711 Ravenna Boulevard, Seattle, Wash.

The regular meetings of the Association, with luncheon, are held at the Engineers' Club, Arctic Building, Third Avenue and Cherry Street, at 12.15 P. M., on the last Monday of each month. Informal luncheons are also held at 12.15 P. M., every Monday at the Engineers' Club.

Special evening meetings are held from time to time for the purpose of discussing important topics, and information concerning these meetings may be had by addressing the Secretary. All members in any grade of the American Society of Civil Engineers are cordially invited to attend the meetings when in the vicinity, and, if located in this District for any length of time, their membership in the Association will be appreciated.

(Abstract of Minutes of Meeting)

March 2d, 1920.—The meeting was called to order at 12.45 P. M., at the Masonic Club; President John L. Hall in the chair; Bertram D. Dean, Secretary; and present, also, 13 members.

The minutes of the Annual Meeting were read and approved.

The President read extracts from a letter from Professor A. H. Fuller relative to the Annual Meeting of the Society and particularly to the report of the Development Committee.

A verbal report of the work of the Committee on Associated Industries was made by Chauncy Wernecke, Chairman, and, on motion, duly seconded, the Committee was discharged.

It was moved and seconded, that the President be instructed to prepare and send out to all members of the Association a circular urging them to vote at as early a date as possible on the "Questionnaire" on the report of the Development Committee. After discussion by Messrs. Mogensen, Wernecke, and Warrack, the motion, duly seconded, was carried unanimously.

On motion, duly seconded, President Hall and Mr. T. E. Phipps were elected as representatives of the Association to the Joint Council of Engineering Societies.

On the suggestion of Mr. J. B. Warrack that the Association go on record as advocating the appointment by the new Mayor of Seattle of an engineer to fill any vacancy occurring in the Board of Public Works, the President was authorized, on motion, duly seconded, to appoint a committee to present the views of the Association to the new Mayor regarding these appointive offices. President Hall appointed Messrs. Jacobs, Wernecke, and Phipps as such committee.

Adjourned.

Southern California Association, Organized 1914.

W. K. Barnard, President; Floyd G. Dessery, Secretary, 514 Central Building, Los Angeles, Cal.

The Southern California Association of Members of the American Society of Civil Engineers (Los Angeles, Cal.) holds regular monthly meetings on the second Wednesday of each month, the December meeting being the Annual Meeting.

Informal luncheons in connection with the Joint Technical Societies of Los Angeles are held at 12.15 P. M., every Thursday at the Broadway Department Store Café.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in Los Angeles, and any such member will be gladly welcomed as a guest at any of the meetings or luncheons.

Spokane Association, Organized 1914.

Alfred D. Butler, President; Charles E. Davis, Secretary-Treasurer, 401 City Hall, Spokane, Wash.

The regular meetings of the Association are held on the second Friday of each month, except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary.

Visiting members are invited to attend the meetings.

Texas Association, Organized 1913.

Hans Helland, President; E. N. Noyes, Secretary, Deere Building, Dallas, Tex.

Utah Association, Organized 1916.

A. B. Villadsen, President, 304 Dooly Bldg., Salt Lake City, Utah.

The Annual Meeting of the Association is held on the first Wednesday in April. The time of other meetings is not fixed, but this information will be furnished on application to the President.

PRIVILEGES OF ENGINEERING SOCIETIES EXTENDED TO MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

Members of the American Society of Civil Engineers will be welcome in the Reading Rooms and at the meetings of many engineering societies in all parts of the world. A list of such societies will be found on pages 42 and 43 of the Year Book of the Society for 1920.

Upon request by its Board of Trustees, the Engineering Societies of Wisconsin, Madison, Wis., is to be added to the above mentioned list, and its members are accorded the usual courtesies and privileges of the Headquarters of the Society.

NEW BOOKS*

(From March 1st to March 31st, 1920)

The statements made in these notices are taken from the books themselves, and this Society is not responsible for them.

DONATIONS TO ENGINEERING SOCIETIES LIBRARY

ELECTRIC OSCILLATIONS AND ELECTRIC WAVES:

With Application to Radiotelegraphy and Incidental Application to Telephony and Optics. By George W. Pierce. N. Y., McGraw-Hill Book Co., Inc.; Lond., Hill Publishing Co., Ltd., 1920. 517 pp., diagrams, tab., 9 x 6 in., cloth. $5.00.

This book is designed to present a mathematical treatment of some of the fundamentals of the theory of electric oscillations and electric waves. In the selection of material, the author has given first consideration to that which is particularly applicable to radiotelegraphy, yet he hopes that, as the electromagnetic theory involved in radiotelegraphy is also fundamental to optics, telephony, and power transmission, his work will be useful to students of these subjects.

ELECTRIC LIGHTING.

By Olin Jerome Ferguson. N. Y., McGraw-Hill Book Co., Inc.; Lond., Hill Publishing Co., Ltd., 1920. 243 pp., illus., diagrams, tab., 9 x 6 in., cloth. $2.50.

Although a number of excellent books exist which cover certain portions of the field included in the title of this volume, the author believes that there is need for a work giving a well-balanced presentation of fundamentals, with principles and practice explained throughout. This need he has tried to meet with a textbook of moderate size.

NOTES ON MAGNETISM:

For the Use of Students of Electrical Engineering. By C. G. Lamb. Cambridge, England, University Press, 1919. 94 pp., 55 illus., 9 x 5 in., paper. (Gift of G. P. Putnam's Sons.)

The author presents an outline of those essential parts of magnetic theory which a student of electrical engineering requires in order to read ordinary technical textbooks with intelligence. The book is based on the course at Cambridge University.

ARMATURE WINDING AND MOTOR REPAIR.

By Daniel H. Braymer. N. Y. and Lond., McGraw-Hill Book Co., Inc., 1920. 515 pp., illus., tab., 8 x 6 in., cloth. $3.00.

This book does not discuss the subject from the point of view of theory or design, but is a compilation of practical methods used by repair men and armature winders. The methods selected are those which represent the best practice in repair shops of average size and are given in detail.

MENSURATION FOR MARINE AND MECHANICAL ENGINEERS:

(Second and First-Class Board of Trade Examinations.) By John W. Angles. Lond. and N. Y., Longmans, Green and Co., 1919. 162 pp., illus., diagrams, 7 x 5 in., cloth. $1.75.

This textbook is intended to enable students to pass the examinations of the Board of Trade (Great Britain) for licenses as marine engineers, but will be useful, the author hopes, to engineering students in other lines. A feature is made of fully solved examples, illustrating the practical applications of the theoretical principles involved in the text.

* Unless otherwise specified, books in this list have been donated by the publishers.

MOTOR VEHICLE ENGINEERING:

Engines (for Automobiles, Trucks, and Tractors). By Ethelbert Favary. Second Edition. N. Y. and Lond., McGraw-Hill Book Co., Inc., 1920. 333 pp., illus., plates, tab., 9 x 6 in., cloth. $3.50.

The author states that many chapters of this edition have been entirely rewritten, that the practical data have been brought up to date, and that the work has been generally revised. The book treats of automobile engines and is intended to give a concise, simple statement of the everyday information needed by automotive engineers.

FLOW AND MEASUREMENT OF AIR AND GASES.

By Alec B. Eason. Lond., Charles Griffin & Co., Ltd.; Phila., J. B. Lippincott Co., 1919. 252 pp., illus., diagrams, tab., 9 x 6 in., cloth. 25 shillings.

The engineering problems investigated in this book arise in connection with pneumatic tubes and compressed air, gas lighting, and ventilating systems. The author has investigated, by study of the literature and by experiment, the friction of gases and the coefficient of friction in pipes, the question of suitable meters for gas and air, and the working of pneumatic tubes, and has attempted to co-ordinate the results of the various tests and formulas, so that the reason for variations may be appreciated. Full references to the sources of information are given.

THE DESIGN OF SCREW PROPELLERS:

With Special Reference to Their Adaptation for Aircraft. By Henry C. Watts. Lond. and N. Y., Longmans, Green and Co., 1920. 340 pp., illus., charts, diagrams, plate, tab., 9 x 6 in., cloth. $8.00.

During the war, the author was in charge of technical work in connection with propellers for aircraft at the Admiralty and Air Ministry of Great Britain, and many of the propellers used were designed by him or under his supervision. This volume records the results of his experience. It is intended as a guide to practical design and gives slight attention to mathematical theory of the behavior of screw propellers. A chapter on the design of windmills is included.

DESIGN AND CONSTRUCTION OF HEAT ENGINES.

By William E. Ninde. N. Y. and Lond., McGraw-Hill Book Co., Inc., 1920. 704 pp., illus., diagrams, tab., 9 x 6 in., cloth. $6.00.

The object of this book is to supply in one volume the material most essential to the well-equipped, independent designer of heat engines, and to give this material in the form most convenient for use in classroom and practical work by a separate treatment of the different phases of the subject. The book is the outgrowth of twenty years' experience, and a study of the literature, drawings, and practical data. The volume is confined to the steam engine, steam turbine, and internal combustion engine. Contents: The Heat Engine; Thermodynamics; Friction and Lubrication; Power and Thrust; Mechanics; Machine Design.

AMERICAN MACHINISTS' HANDBOOK:

A Reference Book of Machine Shop and Drawing-Room Data, Methods, and Definitions. By Fred H. Colvin and Frank A. Stanley. Third Edition, Thoroughly Revised and Enlarged. N. Y. and Lond., McGraw-Hill Book Co., Inc., 1920. 758 pp., illus., diagrams, tab., 7 x 4 in., flexible cloth. $4.00.

This pocket-book has been prepared to present in convenient form such data as will be of value to practical men in the various branches of machine work. The present edition has been thoroughly revised. Seventy-seven pages have been added and much other new material included by the elimination of less important matter from the previous edition.

METALLOGRAPHY:

Part I, Principles of Metallography. By Samuel L. Hoyt. N. Y. and Lond., McGraw-Hill Book Co., Inc., 1920. 256 pp., illus., diagrams, tab., 9 x 6 in., cloth. $3.00.

This volume, the first of a series of three based on the author's lectures at the University of Minnesota, deals with general principles and with some of the more important methods used in general investigations in the metallographic laboratory. Future volumes will discuss the metallography of the metals and alloys and the applications of metallography to the metallurgical and engineering industries.

MANUAL OF CYANIDATION.

By E. M. Hamilton. N. Y. and Lond., McGraw-Hill Book Co., Inc., 1920. 277 pp., illus., tab., 7 x 5 in., flexible cloth. $3.00.

The aim of this book is to provide in a handy sized volume a compendium of all the ascertainable facts concerned with the cyanide process that may have a practical bearing on testing an ore, planning the flow sheet, and operating the plant when erected. Purely theoretical questions have been left in the background.

L'OR: PROSPECTION—GISEMENT—EXTRACTION.

By Georges P. Proust. Paris, Gauthier-Villars et Cie, 1920. 319 pp., illus., 9 x 6 in., paper. 10 francs.

This work by a French mining engineer is a summary account of the mining and metallurgy of gold. After an introductory chapter on mineralogy, the author treats of prospecting and testing, exploitation, preparatory treatment, cyaniding, mining costs, and alluvial mining. A chapter of advice on hygiene and diet for residents in tropical lands is included, and also a mineralogical lexicon. The book is evidently intended for engineers engaged in the development of new mines.

MICROSCOPIC EXAMINATION OF THE ORE MINERALS.

By W. Myron Davy and C. Mason Farnham. N. Y. and Lond., McGraw-Hill Book Co., Inc., 1920. 154 pp., illus., tab., 9 x 6 in., cloth. $2.50.

The authors present a table for determining the identity of ore minerals by means of the reflecting microscope and micro-chemical tests, for the use of mineralogists, geologists, and engineers. In addition to the table, instruction in polishing and examining specimens and in photomicrography is given, as well as a collection of supplementary tests.

MINERAL RESOURCES OF ARMENIA AND ANATOLIA.

By Hagop A. Karajian. N. Y., Armen Technical Book Co., 1920. 211 pp., illus., maps, 9 x 6 in., cloth. $3.00.

This volume is a summary of the knowledge of the mineral resources and the present state of the mining industry in Armenia and Anatolia, accompanied by a survey of the geology of the region. A number of sketch maps and a bibliography are included.

THE IRON HUNTER.

By Chase S. Osborn. N. Y., The Macmillan Co., 1919. 316 pp., plates, portraits, 8 x 5 in., cloth. $2.00.

Ex-Governor Osborn of Michigan has been closely associated with the development of the iron ores of the Northwest and of Canada from the early "Eighties" to the present. It has been his hobby to visit all the commercial iron fields of the world. His autobiography is an interesting, unconventional account of his life as a journalist, prospector, and statesman, full of information about men and affairs during the early mining days in Wisconsin and Michigan.

GRAPHIC PRODUCTION CONTROL.

By C. E. Knoeppel, Assisted by Various Members of the Author's Firm and Staff. N. Y., The Engineering Magazine Co., 1920. 477 pp., illus., diagrams, charts, 9 x 6 in., cloth. $6.00.

This treatise on the use of graphic charts in shop control is intended to provide a complete description of the proper methods of making graphic charts and of applying them to industrial problems. The general principles of graphic control, the preliminaries of its installation, the practical operation of the system, etc., are discussed in detail.

THE ORGANIZATION OF INDUSTRIAL SCIENTIFIC RESEARCH.

By C. E. Kenneth Mees. N. Y. and Lond., McGraw-Hill Book Co., Inc., 1920. 175 pp., 8 x 6 in., cloth. $2.00.

This volume is a contribution to the current discussion of the relation of scientific research to industry. The author is concerned with a study of the best methods of organizing research work for industrial purposes and of the conditions under which such work should be conducted, and has made an effort to give definite suggestions on these points. The book is intended for those who plan to undertake research work rather than as an exposition of its theoretical advantages. Contents: Types of Research Laboratories; Co-operative Laboratories; Position of the Research Laboratory in an Industrial Organization; Internal Organization of Industrial Research Laboratories; Staff of a Research Laboratory; Building and Equipment of the Laboratory; Direction of the Work; Design of a Research Laboratory for a Specific Industry.

STATISTICS IN BUSINESS:

Their Analysis, Charting, and Use. By Horace Secrist. N. Y. and Lond., McGraw-Hill Book Co., Inc., 1920. 137 pp., illus., diagrams, maps, tab., 8 x 6 in., cloth. $1.75.

This volume has been prepared to serve as a handbook for executives in the application of business statistics to problems which arise. It aims to present briefly and concretely the reasons why statistics should be used in business analysis and to illustrate how and with what effect they may be applied to the solution of business problems. The discussion is of a practical nature. Especial attention is given to the use of charts and graphs. Examples of good and bad usage are given.

INTRODUCTION TO GENERAL CHEMISTRY.

By Herbert N. McCoy and Ethel M. Terry. Second Edition. N. Y. and Lond., McGraw-Hill Book Co., Inc., 1920. 648 pp., illus., 9 x 6 in., cloth. $3.00.

This text-book is intended as an introduction to general chemistry for use by college freshmen and is based on the course in the University of Chicago. The aim has been to present a continuous, connected story in teachable form, without unnecessarily extensive descriptive and numerical data. In this edition misprints have been corrected and a chapter on metallurgy has been added.

AMERICAN CIVIL ENGINEERS' HANDBOOK.

Editor-in-Chief, Mansfield Merriman. Fourth Edition. N. Y., John Wiley & Sons, Inc.; Lond., Chapman & Hall, Ltd., 1920. 1955 pp., tab., 7 x 4 in., flexible cloth. $6.00.

The fourth edition of this well-known reference work follows the plan of the previous editions and is the achievement of a board of eighteen associate editors, under the direction of Prof. Merriman. The volume has been thoroughly revised, a collection of mathematical tables included, and new sections on electric railways, irrigation, and drainage have been added. Nearly 400 pages have been added to the work. Because of the comprehensiveness of the book, it has been entitled a "Handbook" instead of, as formerly, a "Pocket Book".

WHITE-LEAD: ITS USE IN PAINT.

By Alvah Horton Sabin. N. Y., John Wiley & Sons, Inc.; Lond., Chapman & Hall, Ltd., 1920. 133 pp., tab., 8 x 5 in., cloth. $1.25.

In his small work Dr. Sabin has provided a brief, non-technical account of the subject for the instruction and guidance of those whose need and use of white lead prompts them to seek knowledge about it of a simple but reliable sort. The various methods of making white lead are given, together with the properties of the usual substitutes, methods of mixing paint for different purposes, etc.

DAVISON'S SILK TRADE:

A Directory of the Silk Manufacturers of the United States and Canada including Silk Dyers, Finishers, and Printers, Manufacturers' Agents, City Offices and Salesrooms of Silk Mills, Dealers in Raw, Thrown, Spun and Artificial Silk, Waste, Cotton, Tinsel and Worsted Yarns. Twenty-fifth Annual Edition. N. Y., Davison Publishing Co., 1920. 782 pp., 7 x 5 in., flexible cloth, pocket edition. $3.00.

The scope of this directory is fully shown by the title. The directory of manufacturers appears in three sections, classified alphabetically, geographically, and by the kind of goods made. The other sections are arranged geographically or alphabetically, as seems more expedient. The volume is of pocket size and provided with a marginal index.

HENDRICKS' COMMERCIAL REGISTER OF THE UNITED STATES

For Buyers and Sellers. Twenty-eighth Annual Edition. N. Y., S. E. Hendricks Co., Inc., 1919-20. 2541 pp., 10 x 8 in., cloth. $12.50.

This new edition, like its predecessors, is devoted to the electrical, engineering, hardware, iron, mechanical, mill, mining, architectural, quarrying, chemical, railroad, steel, contracting and kindred trades. The firms included are listed alphabetically and by products. A subject index and an index of trade names are also included.

THOMAS' REGISTER OF AMERICAN MANUFACTURERS

And First Hands in All Lines. Eleventh Edition. N. Y., Thomas Publishing Co., 1920. 12 x 9 in., cloth. $15.00.

The eleventh edition of this widely known directory has been revised and enlarged to the size of 4 500 pages. It covers manufacturers and dealers in all classes of materials, and contains a classified list of manufacturers with indications of their approximate ratings, an alphabetical list of the more important firm names, and a list of brand or trade names of manufactured articles. Contents: Finding List and Index; Lists of Manufacturers Classified According to Business; Manufacturers of the United States Arranged Alphabetically; Leading Trade Names, Brands, etc.; Banks, Boards of Trade and other Commercial Organizations; Leading Trade Papers; Manufacturers' Representatives; Export and Import Houses; Steamship Lines and Forwarding Agents, Banks, etc.; Overseas Importers, Merchants, etc.

MEMBERSHIP

(From March 5th to April 5th, 1920)

ADDITIONS

MEMBERS		Date of Membership.
ADAMS, WILLIAM HENRY. Cons. Engr.; Chairman, Inland Waterways Committee, Detroit Board of Commerce, Vinton Bldg., Detroit, Mich.	Assoc. M. M.	April 2, 1912 Jan. 20, 1920
ALLEN, EUGENE YORKE. Valuation Engr., C. R. R. of N. J. and P. & R. Ry., 143 Liberty St., New York City.	Assoc. M. M.	Dec. 6, 1905 Mar. 9, 1920
BENEDICT, HAROLD WILLOUGHBY. Asst. Engr., Dept. of State Engr., 292 Fifth Ave., Troy, N. Y.	Assoc. M. M.	Jan. 3, 1911 Mar. 9, 1920
BILYEU, CHARLES SMITH. Asst. to Pres. and Structural Engr., Gulick-Henderson Co., Herald Square Bldg., New York City.	Jun. Assoc. M. M.	Dec. 1, 1908 Dec. 31, 1913 Jan. 20, 1920
BLACKBURN, THOMAS BROGDEN. 722 Bixel St., Los Angeles, Cal.		Oct. 14, 1919
CHENERY, CHRISTOPHER TOMPKINS. McLachlen Bldg., Washington, D. C.		Mar. 9, 1920
CLARK, ELMER WHITE. Asst. Engr., Chf. Engr.'s Dept., P. R. R., 1155 Liberty Ave., Pittsburgh, Pa.		Mar. 9, 1920
FERGUSON, JOHN WILLIAM. Dist. Plant Engr., Oregon Dist., U. S. Shipping Board, Emergency Fleet Corporation, 537 Northwestern Bank Bldg., Portland, Ore.		Mar. 9, 1920
HAGERMAN, HENRY LEHMBERG. With J. E. Sirrine, Box 1221, Greenville, S. C.		Mar. 9, 1920
HALE, HUGH ELLMAKER. Engr., Eastern Group, President's Conference Committee, Federal Valuation of the Railroads in the United States, 32 Nassau St., New York City.		Mar. 9, 1920
HOLLAND, HOWARD KINGSBURY. Cons. Engr. (Holland, Ackerman & Holland), Lawrence Bldg., Ann Arbor, Mich.	Jun. Assoc. M. M.	June 1, 1909 Oct. 29, 1912 Mar. 9, 1920
HOLMES, HUGH BROWNING. Prin. Asst. Engr., Coverdale & Colpitts, 66 Broadway, New York City.	Assoc. M. M.	Nov. 27, 1917 Mar. 9, 1920
HOWSON, ELMER THOMAS. Western Editor, *Railway Age;* Editor, *Railway Maintenance Engineer,* 750 Transportation Bldg., Chicago, Ill.	Assoc. M. M.	May 28, 1912 Mar. 9, 1920
KLYCE, BATTLE HARGROVE. (Klyce & Kackley), 721 Fourth and First National Bank Bldg., Nashville, Tenn.	Assoc. M. M.	June 30, 1911 Mar. 9, 1920

MEMBERS (*Continued*)

		Date of Membership.
KNEEDLER, DAVID HENRY LANE. In Chg., Reinforced Concrete Dept., Cramp & Co., 801 Denckla Bldg., Philadelphia, Pa.		Mar. 9, 1920
LARSEN, ALBERT. Div. Engr., Miami Conservancy Dist., Dayton, Ohio.	Assoc. M. M.	Aug. 31, 1915 Mar. 9, 1920
LEIGH, WORD. Care, Gaston, Williams & Wigmore, Shanghai, China.		Jan. 19, 1920
MACKENZIE, LEON RODERICK. Cons. Engr., Southern Surety Co., 8th Floor, Register & Tribune Bldg., Des Moines, Iowa.	Assoc. M. M.	Sept. 12, 1916 Mar. 9, 1920
MCMILLAN, FRANKLIN R. Care, Turner Constr. Co., 244 Madison Ave., New York City.	Assoc. M. M.	Sept. 11, 1917 Mar. 9, 1920
MATSUMOTO, TORATO. Care, Public Works Dept., Keelung, Formosa, Japan.		Sept. 9, 1919
MELICK, NEAL ALBERT. Chf. Engr., Submarine Boat Corporation (Res., 484 Clifton Ave.), Newark, N. J.	Jun. Assoc. M. M.	Dec. 2, 1902 July 9, 1906 Mar. 9, 1920
MENDENHALL, HERBERT DRUMMOND. Lakeland, Fla.	Jun. Assoc. M. M.	Sept. 4, 1906 July 9, 1912 Mar. 9, 1920
NEWCOMB, WILLIAM TAFT. Engr., Amies Road Co., 710 Drake Bldg., Easton, Pa.	Assoc. M. M.	Feb. 6, 1912 Mar. 9, 1920
PYLE, FRED DALE. Project Mgr., Uncompahgre Valley Project. U. S. Reclamation Service, 718 North 6th St., Montrose, Colo.	Assoc. M. M.	Jan. 17, 1916 Mar. 9, 1920
RANDOLPH, ROBERT ISHAM. Secy. and Treas., Isham Randolph & Co., 208 South La Salle St., Room 1133, Chicago, Ill.	Jun. Assoc. M. M.	July 1, 1909 Nov. 1, 1910 Mar. 9, 1920
RICHARDS, ARTHUR. County Bridge Engr., County Surveyor's Office, Columbus, Ohio.	Jun. Assoc. M. M.	Jan. 4, 1910 Sept. 2, 1914 Mar. 9, 1920
RUGGLES, ARTHUR VALENTINE. Engr. of Constr. and Surveys, Water Dept., Cleveland, Ohio.	Assoc. M. M.	April 30, 1912 Mar. 9, 1920
RUGGLES, CHARLES HERMAN. Cons. Engr.; Chf. Engr., Palm Beach & Gulf Constr. Co., West Palm Beach, Fla.	Assoc. M. M.	Sept. 2, 1914 Mar. 9, 1920
SACKETT, ARTHUR JOHNSON. Care, Mason & Hanger Co., 52 Vanderbilt Ave., New York City.	Jun. Assoc. M. M.	Mar. 1, 1904 Nov. 4, 1914 Mar. 9, 1920
SCHINDLER, ANDREW D. Vice-Pres. and Gen. Mgr., Kings County Development Co., 805 Insurance Exchange Bldg., San Francisco, Cal.		Mar. 9, 1920
SCHMITT, FREDERICK E. Associate Editor, *Engineering News-Record*, 10th Ave. and 36th St., New York City (Res., 22 Carteret St., Montclair, N. J.)		Mar. 9, 1920

MEMBERS (*Continued*)

		Date of Membership.
SCHUTT ALFRED GEORGE. Architectural Engr.; Res., 764 Virginia Park, Detroit, Mich.	Assoc. M.	Sept. 2, 1914
	M.	Mar. 9, 1920
SWINDELLS, JOSEPH SPRINGER. Cons. Engr., 111 Broadway, Room 1110, New York City..	Jun.	Feb. 2, 1897
	Assoc. M.	Mar. 2, 1904
	M.	Mar. 9, 1920
TRACY, JOHN CLAYTON. Prof., Civ. Eng., and Head, Dept. of Civ. Eng., Yale Univ.; Cons. Engr.; Director, New Haven Chamber of Commerce, 345 Winthrop Ave., New Haven, Conn.....		Mar. 9, 1920
WELLS, FRANCIS SPINNER. 25 Fairview Terrace, Malden, Mass.....		Mar. 9, 1920
WHITSIT, LYLE ANTRIM. 226½ Peachtree St., Atlanta, Ga.....	Jun.	Oct. 31, 1905
	Assoc. M.	Sept. 6, 1910
	M.	Mar. 9, 1920
WILLIS, THOMAS LEROY. City Engr., Room 21, City Hall, New Orleans, La.....		Mar. 9, 1920

ASSOCIATE MEMBERS

ANSCHUETZ, OTTO WILLIAM JULIUS. With E. B. Fay (Res., 3614 Arsenal St.), St. Louis, Mo.....	Jun.	May 2, 1911
	Assoc. M.	Mar. 9, 1920
ATWATER, ALBERT WORTHINGTON. Engr., Arthur G. McKee & Co., 2422 Euclid Ave. (Res., 1464 Cordova Ave., Lakewood), Cleveland, Ohio.....		Sept. 9, 1919
BACHMAN, HOWARD FINK. Chf. of Material and Stores, Bethlehem Steel Co., 802 West Broad St., Bethlehem, Pa.....		Nov. 25, 1919
BERNARD, MERRILL MONFORT. City Engr., Crowley, La.....		Mar. 9, 1920
BIRNER, ISADOR LEON. Chf. Engr. and Technical Mgr., The Refinite Co., Refinite Bldg., Omaha, Nebr.....		Mar. 9, 1920
BOND, ARTHUR HAZARD. Res. Engr., Monks & Johnson, 99 Chauncy St., Boston, Mass.....		Mar. 9, 1920
BROWN, PERCY DALLES. Asst. Engr., P. R. R., Broad St. Station, P. R. R., Philadelphia, Pa.....		Mar. 9, 1920
BRUTON, PHILIP GILSTRAP. 2d Lieut., A. S. A. (P.), U. S. A., Bureau of Aircraft Production, 2050 Elmwood Ave., Buffalo, N. Y.....	Jun.	Sept. 10, 1918
	Assoc. M.	Mar. 9, 1920
CALLAN, JOHN ALBERT CHARLTON. 1305 West 22d St., Austin, Tex.....		Mar. 9, 1920
CAMERON, DONALD EUGENE AMES. Archt. and Engr. (Robinette-Bruyere-Cameron), 755 Spitzer Bldg. (Res., 1025 Grand Ave.), Toledo, Ohio.....		Mar. 9, 1920
CAREY, GEORGE JOSEPH FRANCIS. Care, Compania Transmarina de Cuba, Matanzas, Cuba.....		Jan. 19, 1920

ASSOCIATE MEMBERS (*Continued*)	Date of Membership.
CONSOER, ARTHUR WILLIAM. (Consoer Eng. Co.), 1657 Monadnock Blk., Chicago, Ill.	Mar. 9, 1920
COYKENDALL, CLAUDE CARLISLE. Engr., Road Management, Iowa State Highway Comm., 808 Park Ave., Ames, Iowa.	Mar. 9, 1920
DU BOIS, FRANCIS WHEELOCK. 232 Elmhurst Ave., Detroit, Mich.	Oct. 14, 1919
DU BOSE, FRANK FITZPATRICK. With Potts & Prentice, 1410 Amicable Bldg., Waco, Tex.	Mar. 9, 1920
ELTON, RICHARD LEECH. Constr. Engr. and Supt., Builders Material Supply Co., 3330 Tracy Ave., Kansas City, Mo.	Mar. 9, 1920
EMERSON, LEWIS AZRO. (Tomlinson Eng. Co.), 1002 Loan and Exchange Bldg., Columbia, S. C.	Mar. 9, 1920
FARIS, ORVILLE ALVA. Box 497, Boise, Idaho	Mar. 9, 1920
GERAGHTY, LEO MATTHEW. 42 Prichard Ave., West Somerville, Mass.	Oct. 14, 1919
GOODWIN, ALBERT EDWARD. 505 Hill St., Sewickley, Pa.	Mar. 9, 1920
HAMMILL, HAROLD BERNARD. 2032 Parker St., Berkeley, Cal.	Jun. April 2, 1913 Assoc. M. Mar. 9, 1920
HARBAUGH, ROSS ANDERSON. Estimate Engr., Pittsburgh Filter & Eng. Co., 202 West 3d St., Oil City, Pa.	Mar. 9, 1920
HARRIS, JOHN KELLAR. (Harris & Cole), 401 South Oakland Ave., Sharon, Pa.	Mar. 9. 1920
HEWETT, MAURICE WILLIAM. Eng. Contr., William S. Hewett, 530 Metropolitan Bank Bldg., Minneapolis, Minn.	Jun. Sept. 2, 1914 Assoc. M. Mar. 9, 1920
HOGG, JAMES OLIVER, JR. Estimator, Collins Bros., 536 Rialto Bldg., Kansas City, Mo.	Mar. 9, 1920
HURLEY, JOHN JAMES. Branch Mgr., Truscon Steel Co., Room 902, Mutual Home Bldg., Dayton, Ohio.	Jun. April 16, 1918 Assoc. M. Mar. 9, 1920
JAHN, NICHOLAS FIRTH. Contr. (Jahn & Bressi), 710 New York Bldg., Seattle, Wash.	Mar. 9, 1920
JONES, OWEN ROBERT. 520 West 131st St., New York City.	Nov. 25, 1919
JOWERS, GILES MATTHEW. Special Engr., International Boundary Comm., Box 1106, Del Rio, Tex.	Mar. 9, 1920
LAYER, HUGO. (The Shannon Constr. Co.), 1351 South Main St., Akron, Ohio	Jan. 19, 1920
LOWE, HERBERT EDWARD. Engr., Emergency Fleet Corporation, 960 Ventura Ave., Berkeley, Cal.	Jan. 19, 1920
MCAVOY, JAMES PATRICK. Asst. Engr., Valuation Dept., The Delaware & Hudson Co., Room 1003, Delaware & Hudson Bldg., Albany, N. Y.	Mar. 9, 1920

ASSOCIATE MEMBERS (*Continued*)

		Date of Membership.
McNEAR, GEORGE PLUMMER, JR. Care, Guaranty Trust Co. of New York, 140 Broadway, New York City		Mar. 9, 1920
MARTIUS, FREDERICK TRAUGOTT. Engr. in Chg. of Dept., Fuel Oil Storage System, National Boiler Washing Co., Railway Exchange, Chicago, Ill		Mar. 9, 1920
MOONE, MELVIN LYMAN. Asst. City Engr., City Engr.'s Office, Lansing, Mich.	Jun.	Jan. 6, 1915
	Assoc. M.	Mar. 9, 1920
MORSS, FOSTER GILBERT. 606 News Bldg., Salt Lake City, Utah		Mar. 9, 1920
NOICE, BLAINE. 5436 Carlton Way, Los Angeles, Cal.		Mar. 9, 1920
NORTON, JAMES WILLIAM. County Road Engr., Nicholas County, 101 East Chestnut St., Carlisle, Ky.		Mar. 9, 1920
NYGREN. FRANK HARRY. Chf. Engr., A. E. Norton, Inc., 105 West 40th St., New York City (Res., 1803 Ave. Q, Brooklyn, N. Y.)		Mar. 9, 1920
OGDEN, CHESTER WHITE. 507 West End Ave., New York City		Mar. 9, 1920
OPPER, GEORGE LIONEL. Asst. Engr., Marr, Green & Co., 464 South Harrison St., Kankakee, Ill.		Jan. 19, 1920
ORR, GEORGE. Asst. Engr., Eng. Dept., City of Atlantic City, City Hall, Atlantic City, N. J.		Mar. 9, 1920
REYNOLDS, FRANK LOUIS. Vice-Pres., Fox, Reynolds Co., Inc., 81 East 125th St., New York City	Assoc.	Nov. 26, 1918
	Assoc. M.	Mar. 9, 1920
REYNOLDS, RALPH WHITNEY. 292 St. John's Pl., Apartment 50, Brooklyn, N. Y.	Jun.	Nov. 28, 1916
	Assoc. M.	Mar. 9, 1920
ROBERTS, HARRY NORMAN. Cons. Engr., City of Longview, and Cons. Engr., City of Henderson, Box 9, Longview, Tex.		Mar. 9, 1920
SAIGH, NICHOLAS A. Care, Const. Q. M., Camp Travis, San Antonio, Tex.		Mar. 9, 1920
SEMON, EDWARD GOODRICH. Asst. Engr., William Russell Davis, 563 Third St., Albany, N. Y.		Mar. 9, 1920
SERAN, HARRY A. Care, U. S. Coast and Geodetic Survey, Washington, D. C.		Mar. 9, 1920
SHEA, CHELIUS HAZEL. Asst. Div. Engr., The Miami Conservancy Dist., R. R. 4, Piqua, Ohio	Jun.	April 2, 1912
	Assoc. M.	Mar. 9, 1920
SHURGAR, WILL GERALD. Cons. Engr., Box 611, Meridian, Miss.		Mar. 9, 1920
TEWS, FRANK CHARLES. Care, Colfax, Hotel Colfax, Colfax, Wash.		Mar. 9, 1920
THOMASSEN, VICTOR GIFFORD. Res. Engr., U. S. Steel Products Co., 11 rue Edouard VII, Paris, France		Jan. 19, 1920
WALDO, WILLIS GERSHAM. 230 Vine St., Chattanooga, Tenn.		Mar. 9, 1920

ASSOCIATE MEMBERS (*Continued*)

		Date of Membership.
WHITNEY, CHARLES SMITH. Chf. Engr., A. C. Eschweiler, 720 Goldsmith Bldg., Milwaukee, Wis.	Jun.	Dec. 2, 1914
	Assoc. M.	Mar. 9, 1920
WOHLFELD, NATHAN. 1910 Commerce St., Dallas, Tex.		Mar. 9, 1920
WOLCOTT, LESTER OREN. Civ. and Hydr. Engr., San Joaquin Light & Power Corporation (Res., 1560 Van Ness Ave.), Fresno, Cal.		Mar. 9, 1920
WYKKEL, LEO JOHN. Asst. Engr., Kalamazoo County Road Comm., 510 Walnut Court, Kalamazoo, Mich.		Jan. 19, 1920

ASSOCIATES

THORP, JOHN NOTMAN, JR. 631 East 22d St., Paterson, N. J.	Mar. 9, 1920

JUNIORS

BEDELL, FLOYD CARSON. U. S. Junior Engr., U. S. Engr. Office, 39 Whitehall St., Room 710, New York City.	Jan. 19, 1920
BLUNDON, JOSEPH PAUL. County Engr., Boone County Highway Dept., Madison. W. Va.	Oct. 14. 1919
ELLEMAN, JOHN HAWKINS. The Engineer School, Camp A. A. Humphreys, Va.	Jan. 19, 1920
HAERTLEIN, ALBERT. Instr. in Civ. Eng., Harvard Eng. School, 309 Pierce Hall, Cambridge, Mass.	Mar. 9, 1920
HARTLINE, WILLIAM RAYMOND. With The Texas Co., 916 Texas Co. Bldg., Houston, Tex.	Jan. 19, 1920
HSUEH, CHO-PIN. Care, C. Y. Hou, 125 Dryden Rd., Ithaca, N. Y.	Mar. 9, 1920
KAISER, WILLIAM MARTIN. Traffic Mgr., Grant Smith Porter Ship Co., 695 Weidler St., Portland, Ore.	Jan. 19, 1920
NORDGREN, GEORGE ALVIN. 8023 Sangamon St., Chicago, Ill.	Mar 9, 1920
OLSON, LUTHER EMANUEL. Supt. of Constr., A. A. Lane Constr. Co., 1297 Jackson Ave., Lakewood, Ohio.	Nov. 25, 1919
SCHILLING, FRANK MARTIN. McHenry House, Bloomsburg, Pa.	Mar. 9, 1920
SPEIR, OSWALD, JR. Chf. of Party, San Joaquin Light & Power Corporation, Fresno, Cal.	Oct. 14, 1919

DEATHS

ATWOOD, JOHN ABIEL. Elected Member, January 3d, 1900; died February 29th, 1920.

BURBANK, GEORGE BARKER. Elected Member, July 4th, 1888; died February 29th, 1920.

HANSEN, ANDREW CHRISTIAN. Elected Member, October 4th, 1910; died February 9th, 1920.

HATCH, FREDERICK THOMAS. Elected Member, December 4th, 1889; died March 9th, 1920.

HAZLEHURST, GEORGE BLAGDEN. Elected Member, February 1st, 1888; died May 27th, 1919.

NORCROSS, ORLANDO WHITNEY. Elected Member, October 31st, 1911; died February 27th, 1920.

PARSONS, GEORGE WELLMAN. Elected Associate, September 3d, 1884; died August 15th, 1919.

RAYMOND, ALFRED. Elected Member, September 6th, 1910; died January 13th, 1920.

THOMPSON, ELLIS DUNN. Elected Member, February 1st, 1899; died February 9th, 1920.

Total Membership of the Society, April 5th, 1920,

9 441.

MONTHLY LIST OF RECENT ENGINEERING ARTICLES OF INTEREST

(March 1st to April 1st, 1920)

NOTE.—*This list is published for the purpose of placing before the members of this Society the titles of current engineering articles, which can be referred to in any available engineering library, or can be procured by addressing the publication directly, the address and price being given wherever possible.*

LIST OF PUBLICATIONS

In the subjoined list of articles, references are given by the number prefixed to each journal in this list:

(2) *Journal*, Engrs. Club of Phila., Philadelphia, Pa.
(3) *Journal*, Franklin Inst., Philadelphia, Pa., 50c.
(4) *Journal*, Western Soc. of Engrs., Chicago, Ill., 50c.
(5) *Journal*, Eng. Inst. of Canada, Montreal, Que., Canada.
(6) *Journal*, Am. Inst. of Archts., Washington, D. C., 50c.
(7) *Gesundheits Ingenieur*, Munich, Germany.
(8) *Stevens Indicator*, Hoboken, N. J., 50c.
(9) *Industrial Management*, New York City, 25c.
(11) *Engineering* (London), W. H. Wiley, 432 Fourth Ave., New York City, 25c.
(12) *The Engineer* (London), International News Co., New York City, 35c.
(13) *Engineering News-Record*, New York City, 15c.
(15) *Railway Age*, New York City, 15c.
(16) *Engineering and Mining Journal*, New York City, 15c.
(17) *Electric Railway Journal*, New York City, 10c.
(18) *Railway Review*, Chicago, Ill., 15c.
(19) *Scientific American Monthly*, New York City, 10c.
(20) *Iron Age*, New York City, 20c.
(21) *Railway Engineer*, London, England, 1s. 2d.
(22) *Iron and Coal Trades Review*, London, England, 6d.
(24) *American Gas Engineering Journal*, New York City, 10c.
(25) *Railway Mechanical Engineer*, New York City, 20c.
(26) *Electrical Review*, London, England, 4d.
(27) *Electrical World*, New York City, 10c.
(28) *Journal*, New England Water-Works Assoc., Boston, Mass., $1.
(29) *Journal*, Royal Soc. of Arts, London, England, 6d.
(32) *Mémoires et Compte Rendu des Travaux*, Soc. Ing. Civ. de France, Paris, France.
(33) *Le Génie Civil*, Paris, France, 1 fr.
(36) *Cornell Civil Engineer*, Ithaca, N. Y.
(40) *Zentralblatt der Bauverwaltung*, Berlin, Germany, 60 pfg.
(41) *Elektrotechnische Zeitschrift*, Berlin, Germany.
(42) *Journal*, Am. Inst. Elec. Engrs., New York City, $1.
(43) *Annales des Ponts et Chaussées*, Paris, France.
(45) *Coal Age*, New York City, 15c.
(46) *Scientific American*, New York City, 15c.
(47) *Mechanical Engineer*, Manchester, England, 3d.
(48) *Zeitschrift*, Verein Deutscher Ingenieure, Berlin, Germany, 1, 60 m.
(49) *Zeitschrift für Bauwesen*, Berlin, Germany.
(50) *Stahl und Eisen*, Düsseldorf, Germany.
(53) *Zeitschrift*, Oesterreichischer Ingenieur und Architekten-Verein, Vienna, Austria, 70h.
(54) *Transactions*, Am. Soc. C. E., New York City, $16.
(55) *Mechanical Engineering:* Journal, Am. Soc. M. E., New York City, 35c.
(56) *Transactions*, Am. Inst. Min. and Metallurgical Engrs., New York City, $6.
(57) *Colliery Guardian*, London, England, 5d.
(58) *Proceedings*, Engrs.' Soc. of W. Pa., 2511 Oliver Bldg., Pittsburgh, Pa., 50c.
(59) *Proceedings*, American Water Works Assoc., Troy, N. Y.
(60) *Municipal and County Engineering*, Indianapolis, Ind., 25c.
(61) *Proceedings*, Western Railway Club, 225 Dearborn St., Chicago, Ill., 25c.
(62) *American Drop Forger*, Thaw Bldg., Pittsburgh, Pa., 10c.
(63) *Minutes of Proceedings*, Inst. C. E., London, England.
(64) *Power*, New York City, 10c.
(65) *Official Proceedings*, New York Railroad Club, Brooklyn, N. Y., 15c.
(66) *Gas Journal*, London, England, 6d.
(67) *Cement and Engineering News*, Chicago, Ill., 25c.
(69) *Eisenbau*, Leipzig, Germany.
(71) *Journal*, Iron and Steel Inst., London, England.
(71a) *Carnegie Scholarship Memoirs*, Iron and Steel Inst., London, England.

(72) *American Machinist*, New York City, 15c.
(73) *Electrician*, London, England, 18c.
(75) *Proceedings*, Inst. of Mech. Engrs., London, England.
(77) *Journal*, Inst. Elec. Engrs., London, England, 5s.
(78) *Beton und Eisen*, Vienna, Austria, 1, 50m.
(80) *Tonindustrie Zeitung*, Berlin, Germany.
(83) *Gas Age*, New York City, 15c.
(85) *Proceedings*, Am. Ry. Eng. Assoc., Chicago, Ill.
(86) *Engineering and Contracting*, Chicago, Ill., 10c.
(87) *Railway Maintenance Engineer*, Chicago, Ill., 10c.
(88) *Bulletin* of the International Ry. Congress Assoc., Brussels, Belgium.
(89) *Proceedings*, Am. Soc. for Testing Materials, Philadelphia, Pa., $5.
(90) *Transactions*, Inst. of Naval Archts., London, England.
(91) *Transactions*, Soc. of Naval Archts. and Marine Engrs., New York City.
(92) *Bulletin*, Soc d'Encouragement pour l'Industrie Nationale, Paris, France.
(93) *Revue de Métallurgie*, Paris, France, 4 fr. 50.
(96) *Canadian Engineer*, Toronto, Ont., Canada, 10c.
(98) *Journal*, Engrs. Soc. of Pa., Harrisburg, Pa., 30c.
(99) *Proceedings*, Am. Soc. of Municipal Improvements, New York City, $2.
(100) *Military Engineer:* Journal of the Society of American Military Engineers, Washington, D. C., 75c.
(103) *Mining and Scientific Press*, San Francisco, Cal., 10c.
(104) *The Surveyor and Municipal and County Engineer*, London, England, 6d.
(105) *Chemical and Metallurgical Engineering*, New York City, 25c.
(106) *Transactions*, Inst. of Min. Engrs., London, England, 6s.
(107) *Schweizerische Bauzeitung*, Zürich, Switzerland.
(109) *Journal*, Boston Soc. C. E., Boston, Mass., 50c.
(111) *Journal of Electricity*, San Francisco, Cal., 25c.
(113) *Proceedings*, Am. Wood Preservers' Assoc., Baltimore, Md.
(114) *Journal*, Institution of Municipal and County Engineers, London, England, 1s. 6d.
(115) *Journal*, Engrs.' Club of St. Louis, St. Louis, Mo., 35c.
(116) *Blast Furnace and Steel Plant*, Pittsburgh, Pa., 15c.
(117) *Engineering World*, Chicago, Ill.
(118) *Times Engineering Supplement*, London, England, 2d.
(119) *Landscape Architecture*, Harrisburg, Pa., 50c.
(120) *Automotive Industries*, New York City, 15c.
(121) *Proceedings*, Am. Concrete Inst., Boston, Mass.

LIST OF ARTICLES

Bridges.

The Key Bridge Cofferdams.* John T. Talman. (100) Jan.-Feb.
Functions and Work of the Resident Engineer on Bridge Construction. J. A. L. Waddell. (4) Feb. 20.
Three Bridges in Palestine Built by Canadians.* A. P. Linton. (96) Feb. 26.
Some Experiences in Foundation Failures.* Reginald B. Evans. (96) Feb. 26.
Anchor Pins of Cornwall Cantilever Bridge Bored Out and Renewed.* H. T. Welty. (13) Mar. 4.
Design Details and Field Methods on Thin Arch Dam.* (Describes straddling trestle.) (13) Mar. 4.
New York Central Railroad Accommodates Itself to Construction of Barge Canal.* B. S. Voorhees. (13) Mar. 11.
Reconstructing Poughkeepsie Cantilever Bridge for Heavy Traffic.* Clement E. Chase. (13) Mar. 11.
A Double-Leaf Bascule Span Designed as a Three-Hinged Arch.* (15) Mar. 18 (Daily ed.)
Strengthening a County Bridge to Carry Motor-Truck Traffic.* Morris Goodkind. (13) Mar. 25.
Die Ohioflussbrücke der Chesapeake and Ohio Northern-Eisenbahn bei Sciotoville in Ohio.* Georg Chr. Mehrtens. (48) Apr. 22, 1916.
Ueber den Bau der Höllentor-Brücke in der New York-Verbindungsbahn.* Georg Christoph Mehrtens. (48) Serial beginning May 13, 1916.
Wiederherstellung gesprengter eiserner Brücken.* G. Barkhausen. (48) Serial beginning July 22, 1916.
Altes und Neues von eisernen Brücken.* Georg Christoph Mehrtens. (48) Serial beginning Feb. 3, 1917.
Einarmige Klappbrücke von 42 m Stützweite über die Trollhättakanal bei Wenersburg (Schweden).* G. Barkhausen. (48) Serial beginning May 12, 1917.

Electrical.

Electrostatic Precipitation.* O. H. Eschholz. (56) Vol. 60, 1919.
Failures of Turbo-Generators and Suggestions for Improvements.* J. Shepherd. (77) Feb.

* Illustrated.

Electrical—(Continued).

The High-Frequency Resistance of Wires and Coils.* G. W. O. Howe. (77) Feb.
Electricity in Tin Mining.* D. M. W. Hutchison and W. J. Wayte. (77) Feb.
Submarine Detection in an Alternating Magnetic Field.* J. B. Whitehead and L. O. Grondahl. (42) Serial beginning Mar.
Changing 33-Cycle Apparatus to Operate on 60-Cycle Circuits.* D. W. Proebstel and E. H. Le Tourneau. (42) Mar.
Constant Potential Series Lighting. Chas. P. Steinmetz. (42) Mar.
The Alternating-Current Commutator Motor.* B. G. Lamme. (42) Mar.
Electric Power Supply of Southern Textile Mills.* J. E. Sirrine. (55) Mar.
Eastern Connecticut Served by New Station.* E. T. Phillips. (27) Mar. 6.
Determining Losses in Transmission Lines.* Oscar Gaarden. (27) Mar. 6.
Analysis of Insulator Practice.* (27) Mar. 6.
How Power Factor Affects the Voltage Regulation of an Alternator.* Quinten Graham. (64) Mar. 9.
Electric Engines and Mine Hoists.* H. H. Broughton. (73) Serial beginning Mar. 12.
Paralleling Synchronous Frequency Changers.* Errol B. Shand. (27) Mar. 13.
Self-Exciting Synchronous Motor.* J. K. Kostko. (27) Mar. 27.
Short-Circuit Currents in Networks.* W. R. Woodward. (27) Mar. 27.
Chile Exploration Company's Tocopilla Power Plant.* (64) Mar. 30.
Les Tubes a Décharge Electronique et leur Applications.* P. Letheuls. (33) Serial beginning Feb. 21.
L'Electrification des Chemins de Fer aux Etats-Unis et la Protection des Lignes Télégraphiques et Téléphoniques. (33) Feb. 14.
Das hydraulische Akkumlierwerk in Neckartenzlingen.* R. Thomann. (48) Serial beginning Apr. 15, 1916.
Anlass-und Regelvorrichtungen Druckknopfsteuerungen und elektrische Vorschübe für Werkzeugmaschinen.* O. Pollok. (48) Serial beginning Apr. 29, 1916.
Probleme der Röntgentechnik.* P. Ludewig. (48) Serial beginning Jan. 13, 1917.
Fabrikbeleuchtung.* N. A. Halbertsma. (48) Feb. 3, 1917.
Hochstausnutzung der Gefälle mit kleinstem Aufwand bei Erschliessung unserer Niederdruckwasserkräfte; ihr Einfluss auf die wirtschaftlichen Verhältnisse Bayerns und auf die Unabhängigkeit des Reiches vom Auslande.* Johann Hallinger. (48) Serial beginning Mar. 3, 1917.
Bogenlampe und Glühlampe, eine vergleichende Studie. Heyck. (48) July 14, 1917.
Die Förderanlagen im Neubau des Haupttelegraphenamtes in Berlin.* Kasten. (48) Serial beginning Aug. 25, 1917.
Die innere Aufbau des Chemischen Atoms und seine Erforschung durch Röntgenstrahlen.* A. Sommerfeld. (48) Serial beginning Oct. 13, 1917.

Marine.

Ships of the British Navy on August 4, 1914, and Some Matters of Interest in Connection with Their Production.* Philip Watts. (90) Vol. 61, 1919.
Italian Two-Floodable-Compartment Cargo Steamers. Salvatore Orlando. (90) Vol. 61, 1919.
Naval Construction During the War.* Eustace Tennyson d'Eyncourt. (90) Vol. 61, 1919.
Some Recent Developments Towards a Simplification of Merchant Ship Construction.* Eustace Tennyson d'Eyncourt and Thomas Graham. (90) Vol. 61, 1919.
Investigations Into the Causes of Corrosion or Erosion of Propellers.* Charles A. Parsons and Stanley S. Cook. (90) Vol. 61, 1919.
The Michell Thrust Block.* J. Hamilton Gibson. (90) Vol. 61, 1919.
Some Experiences with Electric Welding in Warships.* W. H. Gard. (90) Vol. 61, 1919.
Further Experiments on Stress Determination in Flat Steel Plates.* J. Montgomerie. (90) Vol. 61, 1919.
The Tonnage of Modern Steamships.* A. T. Wall. (90) Vol. 61, 1919.
Model Experiments on the Effect of Beam on the Resistance of Mercantile Ship Forms.* J. L. Kent. (90) Vol. 61, 1919.
The Gyrostatic Compass.* Sidney G. Brown. (From paper read before Royal Inst.) (11) Feb. 13.
The Theory of the Michell Thrust Bearing.* (11) Feb. 20.
Drop Forging as Applied to Shipbuilding.* Joseph L. Murphy. (62) Serial beginning Mar.
Submarine Detection in an Alternating Magnetic Field.* J. B. Whitehead and L. O. Grondahl. (42) Serial beginning Mar.
Motion Study of Side Launching of 6 000-Ton Vessel. (13) Mar. 4.
Flying Boats—The Form and Dimensions of Their Hull.* G. S. Baker. (Paper read before North-East Coast Inst. of Engrs. and Shipbuilders.) (11) Mar. 5.
Uncle Sam's Greatest Navy Yard.* R. D. Gatewood. (72) Mar. 11.

* Illustrated.

(Electric—(Continued).

The High-Frequency Resistance of Wires and Coils.* C. W. O. Howe. (17) Feb.
Electric Power in Tin Mining.* R. M. W. Hutchings and W. J. Wyrie. (17) Feb.
Submarine Detection in an Alternating Magnetic Field.* J. B. Wardrobe and L. O. Grondahl. (62) April Scientific Abstract.
Changing 60-Cycle Apparatus to Operate on 50-Cycle Circuits.* D. W. Trenholme and H. H. C. Dunwoody. (12) Mar.
Constant Potential Series Lighting. Class C Equipment. (12) Mar.
The Alternating-Current Commutator Motor.* H. O. Taylor. (12) Mar.
Electric Power Supply of Southern Texas Mills.* I. E. Stiffler. (37) Mar. 6.
Electric Condensers, Devoid of Mica Plates.* E. T. Phillips. (37) Mar. 6.
Determining Losses in Transformer Cores.* Oscar Guerdan. (37) Mar. 6.
Lightning Arresters for Protection of Power Circuits.* (37) Mar. 6.
How Power Under Adverse Conditions Is Delivered to an Aluminum.* Quinton Draper. (60) Mar. 9.
Electric Heating and Its Uses.* H. H. Henshaw. (24) Serial beginning Mar. 12.
Electric Welding Equipment.* Royal H. Bland. (42) Mar. 12.
Electric Furnace Operation.* J. E. Fogle. (37) Mar. 27.
Electric Current in Nevada.* W. H. Woodward. (37) Mar. 27.
Electric Power Supply for Mines.* Frank Haas. (60) Mar. 30.
The Installation and Operation of Low Voltage Motors.* C. Ledoux. (32) Serial beginning Mar. 30.
Electric Heating and Its Uses.* (24)
Electrification des Chemins de Fer aux Etats-Unis et la Protection des Lignes Telephoniques.* A. Allenbourg. In Zeitschrift. H. Thomsen. (46) Feb. 14.
Telephonie et Telegraphie sans Fil. (46)
Metal Welding. (12) Feb. 14.
Electric Welding. (12) Feb. 14.
Electrical Developments in Mexico.* (60) Beginning Jan. 23.
Problems Are Considered.* C. Proctor. (60) Serial beginning Jan. 16.
Electric Welding. (12) Jan. 10.
Electrical Developments in Mexico.* (60) Beginning Jan. 9.
Electrical Developments in Mexico.* (60) Beginning Jan. 2.
Electrical Developments in Mexico.* (60) Beginning Dec. 26.
Electrical Developments in Mexico.* (60) Beginning Dec. 19.
Electrical Developments in Mexico.* (60) Beginning Dec. 12.
Electrical Developments in Mexico.* (60) Beginning Dec. 5.
Electrical Developments in Mexico.* (60) Beginning Nov. 28.
Electrical Developments in Mexico.* (60) Beginning Nov. 21.
Electrical Developments in Mexico.* (60) Beginning Nov. 14.
Electrical Developments in Mexico.* (60) Beginning Nov. 7.
Electrical Developments in Mexico.* (60) Beginning Oct. 31.
Electrical Developments in Mexico.* (60) Beginning Oct. 24.
Electrical Developments in Mexico.* (60) Beginning Oct. 17.
Electrical Developments in Mexico.* (60) Beginning Oct. 10.
Electrical Developments in Mexico.* (60) Beginning Oct. 3.
Electrical Developments in Mexico.* (60) Beginning Sept. 26.
Electrical Developments in Mexico.* (60) Beginning Sept. 19.
Electrical Developments in Mexico.* (60) Beginning Sept. 12.
Electrical Developments in Mexico.* (60) Beginning Sept. 5.
Electrical Developments in Mexico.* (60) Beginning Aug. 29.
Electrical Developments in Mexico.* (60) Beginning Aug. 22.
Electrical Developments in Mexico.* (60) Beginning Aug. 15.
Electrical Developments in Mexico.* (60) Beginning Aug. 8.
Electrical Developments in Mexico.* (60) Beginning Aug. 1.
Electrical Developments in Mexico.* (60) Beginning July 25.
Electrical Developments in Mexico.* (60) Beginning July 18.
Electrical Developments in Mexico.* (60) Beginning July 11.
Electrical Developments in Mexico.* (60) Beginning July 4.
Electrical Developments in Mexico.* (60) Beginning June 27.
Electrical Developments in Mexico.* (60) Beginning June 20.
Electrical Developments in Mexico.* (60) Beginning June 13.
Electrical Developments in Mexico.* (60) Beginning June 6.
Electrical Developments in Mexico.* (60) Beginning May 30.
Electrical Developments in Mexico.* (60) Beginning May 23.
Electrical Developments in Mexico.* (60) Beginning May 16.
Electrical Developments in Mexico.* (60) Beginning May 9.
Electrical Developments in Mexico.* (60) Beginning May 2.
Electrical Developments in Mexico.* (60) Beginning April 25.
Electrical Developments in Mexico.* (60) Beginning April 18.
Electrical Developments in Mexico.* (60) Beginning April 11.
Electrical Developments in Mexico.* (60) Beginning April 4.
Electrical Developments in Mexico.* (60) Beginning March 28.
Electrical Developments in Mexico.* (60) Beginning March 21.
Electrical Developments in Mexico.* (60) Beginning March 14.
Electrical Developments in Mexico.* (60) Beginning March 7.
Electrical Developments in Mexico.* (60) Beginning Feb. 29.
Electrical Developments in Mexico.* (60) Beginning Feb. 22.
Electrical Developments in Mexico.* (60) Beginning Feb. 15.
Electrical Developments in Mexico.* (60) Beginning Feb. 8.
Electrical Developments in Mexico.* (60) Beginning Feb. 1.
Electrical Developments in Mexico.* (60) Beginning Jan. 25.
Electrical Developments in Mexico.* (60) Beginning Jan. 18.
Electrical Developments in Mexico.* (60) Beginning Jan. 11.
Electrical Developments in Mexico.* (60) Beginning Jan. 4.
Electrical Developments in Mexico.* (60) Beginning Dec. 28.
Electrical Developments in Mexico.* (60) Beginning Dec. 21.
Electrical Developments in Mexico.* (60) Beginning Dec. 14.
Electrical Developments in Mexico.* (60) Beginning Dec. 7.
Electrical Developments in Mexico.* (60) Beginning Nov. 30.
Electrical Developments in Mexico.* (60) Beginning Nov. 23.
Electrical Developments in Mexico.* (60) Beginning Nov. 16.
Electrical Developments in Mexico.* (60) Beginning Nov. 9.
Electrical Developments in Mexico.* (60) Beginning Nov. 2.
Electrical Developments in Mexico.* (60) Beginning Oct. 26.
Electrical Developments in Mexico.* (60) Beginning Oct. 19.
Electrical Developments in Mexico.* (60) Beginning Oct. 12.
Electrical Developments in Mexico.* (60) Beginning Oct. 5.
Electrical Developments in Mexico.* (60) Beginning Sept. 28.
Electrical Developments in Mexico.* (60) Beginning Sept. 21.
Electrical Developments in Mexico.* (60) Beginning Sept. 14.
Electrical Developments in Mexico.* (60) Beginning Sept. 7.
Electrical Developments in Mexico.* (60) Beginning Aug. 31.
Electrical Developments in Mexico.* (60) Beginning Aug. 24.
Electrical Developments in Mexico.* (60) Beginning Aug. 17.
Electrical Developments in Mexico.* (60) Beginning Aug. 10.
Electrical Developments in Mexico.* (60) Beginning Aug. 3.
Electrical Developments in Mexico.* (60) Beginning July 27.
Electrical Developments in Mexico.* (60) Beginning July 20.
Electrical Developments in Mexico.* (60) Beginning July 13.
Electrical Developments in Mexico.* (60) Beginning July 6.
Electrical Developments in Mexico.* (60) Beginning June 29.
Electrical Developments in Mexico.* (60) Beginning June 22.
Electrical Developments in Mexico.* (60) Beginning June 15.
Electrical Developments in Mexico.* (60) Beginning June 8.
Electrical Developments in Mexico.* (60) Beginning June 1.
Electrical Developments in Mexico.* (60) Beginning May 25.
Electrical Developments in Mexico.* (60) Beginning May 18.
Electrical Developments in Mexico.* (60) Beginning May 11.
Electrical Developments in Mexico.* (60) Beginning May 4.
Electrical Developments in Mexico.* (60) Beginning April 27.
Electrical Developments in Mexico.* (60) Beginning April 20.
Electrical Developments in Mexico.* (60) Beginning April 13.
Electrical Developments in Mexico.* (60) Beginning April 6.
Electrical Developments in Mexico.* (60) Beginning March 30.
Electrical Developments in Mexico.* (60) Beginning March 23.
Electrical Developments in Mexico.* (60) Beginning March 16.
Electrical Developments in Mexico.* (60) Beginning March 9.
Electrical Developments in Mexico.* (60) Beginning March 2.
Electrical Developments in Mexico.* (60) Beginning Feb. 24.
Electrical Developments in Mexico.* (60) Beginning Feb. 17.
Electrical Developments in Mexico.* (60) Beginning Feb. 10.
Electrical Developments in Mexico.* (60) Beginning Feb. 3.
Electrical Developments in Mexico.* (60) Beginning Jan. 27.
Electrical Developments in Mexico.* (60) Beginning Jan. 20.
Electrical Developments in Mexico.* (60) Beginning Jan. 13.
Electrical Developments in Mexico.* (60) Beginning Jan. 6.
Electrical Developments in Mexico.* (60) Beginning Dec. 30.
Electrical Developments in Mexico.* (60) Beginning Dec. 23.
Electrical Developments in Mexico.* (60) Beginning Dec. 16.
Electrical Developments in Mexico.* (60) Beginning Dec. 9.
Electrical Developments in Mexico.* (60) Beginning Dec. 2.
Electrical Developments in Mexico.* (60) Beginning Nov. 25.
Electrical Developments in Mexico.* (60) Beginning Nov. 18.
Electrical Developments in Mexico.* (60) Beginning Nov. 11.
Electrical Developments in Mexico.* (60) Beginning Nov. 4.
Electrical Developments in Mexico.* (60) Beginning Oct. 28.
Electrical Developments in Mexico.* (60) Beginning Oct. 21.
Electrical Developments in Mexico.* (60) Beginning Oct. 14.
Electrical Developments in Mexico.* (60) Beginning Oct. 7.
Electrical Developments in Mexico.* (60) Beginning Sept. 30.
Electrical Developments in Mexico.* (60) Beginning Sept. 23.
Electrical Developments in Mexico.* (60) Beginning Sept. 16.
Electrical Developments in Mexico.* (60) Beginning Sept. 9.
Electrical Developments in Mexico.* (60) Beginning Sept. 2.
Electrical Developments in Mexico.* (60) Beginning Aug. 26.
Electrical Developments in Mexico.* (60) Beginning Aug. 19.
Electrical Developments in Mexico.* (60) Beginning Aug. 12.
Electrical Developments in Mexico.* (60) Beginning Aug. 5.
Electrical Developments in Mexico.* (60) Beginning July 29.
Electrical Developments in Mexico.* (60) Beginning July 22.
Electrical Developments in Mexico.* (60) Beginning July 15.
Electrical Developments in Mexico.* (60) Beginning July 8.
Electrical Developments in Mexico.* (60) Beginning July 1.
Electrical Developments in Mexico.* (60) Beginning June 24.
Electrical Developments in Mexico.* (60) Beginning June 17.
Electrical Developments in Mexico.* (60) Beginning June 10.
Electrical Developments in Mexico.* (60) Beginning June 3.
Electrical Developments in Mexico.* (60) Beginning May 27.
Electrical Developments in Mexico.* (60) Beginning May 20.
Electrical Developments in Mexico.* (60) Beginning May 13.
Electrical Developments in Mexico.* (60) Beginning May 6.
Electrical Developments in Mexico.* (60) Beginning April 29.
Electrical Developments in Mexico.* (60) Beginning April 22.
Electrical Developments in Mexico.* (60) Beginning April 15.
Electrical Developments in Mexico.* (60) Beginning April 8.
Electrical Developments in Mexico.* (60) Beginning April 1.
Electrical Developments in Mexico.* (60) Beginning March 25.
Electrical Developments in Mexico.* (60) Beginning March 18.
Electrical Developments in Mexico.* (60) Beginning March 11.
Electrical Developments in Mexico.* (60) Beginning March 4.
Electrical Developments in Mexico.* (60) Beginning Feb. 26.
Electrical Developments in Mexico.* (60) Beginning Feb. 19.
Electrical Developments in Mexico.* (60) Beginning Feb. 12.
Electrical Developments in Mexico.* (60) Beginning Feb. 5.
Electrical Developments in Mexico.* (60) Beginning Jan. 29.
Electrical Developments in Mexico.* (60) Beginning Jan. 22.
Electrical Developments in Mexico.* (60) Beginning Jan. 15.
Electrical Developments in Mexico.* (60) Beginning Jan. 8.
Electrical Developments in Mexico.* (60) Beginning Jan. 1.
Electrical Developments in Mexico.* (60) Beginning Dec. 25.
Electrical Developments in Mexico.* (60) Beginning Dec. 18.
Electrical Developments in Mexico.* (60) Beginning Dec. 11.
Electrical Developments in Mexico.* (60) Beginning Dec. 4.
Electrical Developments in Mexico.* (60) Beginning Nov. 27.
Electrical Developments in Mexico.* (60) Beginning Nov. 20.
Electrical Developments in Mexico.* (60) Beginning Nov. 13.
Electrical Developments in Mexico.* (60) Beginning Nov. 6.
Electrical Developments in Mexico.* (60) Beginning Oct. 30.
Electrical Developments in Mexico.* (60) Beginning Oct. 23.
Electrical Developments in Mexico.* (60) Beginning Oct. 16.
Electrical Developments in Mexico.* (60) Beginning Oct. 9.
Electrical Developments in Mexico.* (60) Beginning Oct. 2.
Electrical Developments in Mexico.* (60) Beginning Sept. 25.
Electrical Developments in Mexico.* (60) Beginning Sept. 18.
Electrical Developments in Mexico.* (60) Beginning Sept. 11.
Electrical Developments in Mexico.* (60) Beginning Sept. 4.
Electrical Developments in Mexico.* (60) Beginning Aug. 28.
Electrical Developments in Mexico.* (60) Beginning Aug. 21.
Electrical Developments in Mexico.* (60) Beginning Aug. 14.
Electrical Developments in Mexico.* (60) Beginning Aug. 7.
Electrical Developments in Mexico.* (60) Beginning July 31.
Electrical Developments in Mexico.* (60) Beginning July 24.
Electrical Developments in Mexico.* (60) Beginning July 17.
Electrical Developments in Mexico.* (60) Beginning July 10.
Electrical Developments in Mexico.* (60) Beginning July 3.
Electrical Developments in Mexico.* (60) Beginning June 26.
Electrical Developments in Mexico.* (60) Beginning June 19.
Electrical Developments in Mexico.* (60) Beginning June 12.
Electrical Developments in Mexico.* (60) Beginning June 5.
Electrical Developments in Mexico.* (60) Beginning May 29.
Electrical Developments in Mexico.* (60) Beginning May 22.
Electrical Developments in Mexico.* (60) Beginning May 15.
Electrical Developments in Mexico.* (60) Beginning May 8.
Electrical Developments in Mexico.* (60) Beginning May 1.
Electrical Developments in Mexico.* (60) Beginning April 24.
Electrical Developments in Mexico.* (60) Beginning April 17.
Electrical Developments in Mexico.* (60) Beginning April 10.
Electrical Developments in Mexico.* (60) Beginning April 3.
Electrical Developments in Mexico.* (60) Beginning March 27.
Electrical Developments in Mexico.* (60) Beginning March 20.
Electrical Developments in Mexico.* (60) Beginning March 13.
Electrical Developments in Mexico.* (60) Beginning March 6.
Electrical Developments in Mexico.* (60) Beginning Feb. 28.
Electrical Developments in Mexico.* (60) Beginning Feb. 21.
Electrical Developments in Mexico.* (60) Beginning Feb. 14.
Electrical Developments in Mexico.* (60) Beginning Feb. 7.
Electrical Developments in Mexico.* (60) Beginning Jan. 31.
Electrical Developments in Mexico.* (60) Beginning Jan. 24.
Electrical Developments in Mexico.* (60) Beginning Jan. 17.
Electrical Developments in Mexico.* (60) Beginning Jan. 10.
Electrical Developments in Mexico.* (60) Beginning Jan. 3.
Electrical Developments in Mexico.* (60) Beginning Dec. 27.
Electrical Developments in Mexico.* (60) Beginning Dec. 20.
Electrical Developments in Mexico.* (60) Beginning Dec. 13.
Electrical Developments in Mexico.* (60) Beginning Dec. 6.
Electrical Developments in Mexico.* (60) Beginning Nov. 29.
Electrical Developments in Mexico.* (60) Beginning Nov. 22.
Electrical Developments in Mexico.* (60) Beginning Nov. 15.
Electrical Developments in Mexico.* (60) Beginning Nov. 8.
Electrical Developments in Mexico.* (60) Beginning Nov. 1.
Electrical Developments in Mexico.* (60) Beginning Oct. 25.
Electrical Developments in Mexico.* (60) Beginning Oct. 18.
Electrical Developments in Mexico.* (60) Beginning Oct. 11.
Electrical Developments in Mexico.* (60) Beginning Oct. 4.
Electrical Developments in Mexico.* (60) Beginning Sept. 27.
Electrical Developments in Mexico.* (60) Beginning Sept. 20.
Electrical Developments in Mexico.* (60) Beginning Sept. 13.
Electrical Developments in Mexico.* (60) Beginning Sept. 6.
Electrical Developments in Mexico.* (60) Beginning Aug. 30.
Electrical Developments in Mexico.* (60) Beginning Aug. 23.
Electrical Developments in Mexico.* (60) Beginning Aug. 16.
Electrical Developments in Mexico.* (60) Beginning Aug. 9.
Electrical Developments in Mexico.* (60) Beginning Aug. 2.
Electrical Developments in Mexico.* (60) Beginning July 26.
Electrical Developments in Mexico.* (60) Beginning July 19.
Electrical Developments in Mexico.* (60) Beginning July 12.
Electrical Developments in Mexico.* (60) Beginning July 5.
Electrical Developments in Mexico.* (60) Beginning June 28.
Electrical Developments in Mexico.* (60) Beginning June 21.
Electrical Developments in Mexico.* (60) Beginning June 14.
Electrical Developments in Mexico.* (60) Beginning June 7.
Electrical Developments in Mexico.* (60) Beginning May 31.
Electrical Developments in Mexico.* (60) Beginning May 24.
Electrical Developments in Mexico.* (60) Beginning May 17.
Electrical Developments in Mexico.* (60) Beginning May 10.
Electrical Developments in Mexico.* (60) Beginning May 3.
Electrical Developments in Mexico.* (60) Beginning April 26.
Electrical Developments in Mexico.* (60) Beginning April 19.
Electrical Developments in Mexico.* (60) Beginning April 12.
Electrical Developments in Mexico.* (60) Beginning April 5.
Electrical Developments in Mexico.* (60) Beginning March 29.
Electrical Developments in Mexico.* (60) Beginning March 22.
Electrical Developments in Mexico.* (60) Beginning March 15.
Electrical Developments in Mexico.* (60) Beginning March 8.
Electrical Developments in Mexico.* (60) Beginning March 1.
Electrical Developments in Mexico.* (60) Beginning Feb. 23.
Electrical Developments in Mexico.* (60) Beginning Feb. 16.
Electrical Developments in Mexico.* (60) Beginning Feb. 9.
Electrical Developments in Mexico.* (60) Beginning Feb. 2.
Electrical Developments in Mexico.* (60) Beginning Jan. 26.
Electrical Developments in Mexico.* (60) Beginning Jan. 19.
Electrical Developments in Mexico.* (60) Beginning Jan. 12.
Electrical Developments in Mexico.* (60) Beginning Jan. 5.
Electrical Developments in Mexico.* (60) Beginning Dec. 29.
Electrical Developments in Mexico.* (60) Beginning Dec. 22.
Electrical Developments in Mexico.* (60) Beginning Dec. 15.
Electrical Developments in Mexico.* (60) Beginning Dec. 8.
Electrical Developments in Mexico.* (60) Beginning Dec. 1.
Electrical Developments in Mexico.* (60) Beginning Nov. 24.
Electrical Developments in Mexico.* (60) Beginning Nov. 17.
Electrical Developments in Mexico.* (60) Beginning Nov. 10.
Electrical Developments in Mexico.* (60) Beginning Nov. 3.
Electrical Developments in Mexico.* (60) Beginning Oct. 27.
Electrical Developments in Mexico.* (60) Beginning Oct. 20.
Electrical Developments in Mexico.* (60) Beginning Oct. 13.
Electrical Developments in Mexico.* (60) Beginning Oct. 6.
Electrical Developments in Mexico.* (60) Beginning Sept. 29.
Electrical Developments in Mexico.* (60) Beginning Sept. 22.
Electrical Developments in Mexico.* (60) Beginning Sept. 15.
Electrical Developments in Mexico.* (60) Beginning Sept. 8.
Electrical Developments in Mexico.* (60) Beginning Sept. 1.
Electrical Developments in Mexico.* (60) Beginning Aug. 25.
Electrical Developments in Mexico.* (60) Beginning Aug. 18.
Electrical Developments in Mexico.* (60) Beginning Aug. 11.
Electrical Developments in Mexico.* (60) Beginning Aug. 4.
Electrical Developments in Mexico.* (60) Beginning July 28.
Electrical Developments in Mexico.* (60) Beginning July 21.
Electrical Developments in Mexico.* (60) Beginning July 14.
Electrical Developments in Mexico.* (60) Beginning July 7.
Electrical Developments in Mexico.* (60) Beginning June 30.
Electrical Developments in Mexico.* (60) Beginning June 23.
Electrical Developments in Mexico.* (60) Beginning June 16.
Electrical Developments in Mexico.* (60) Beginning June 9.
Electrical Developments in Mexico.* (60) Beginning June 2.
Electrical Developments in Mexico.* (60) Beginning May 26.
Electrical Developments in Mexico.* (60) Beginning May 19.
Electrical Developments in Mexico.* (60) Beginning May 12.
Electrical Developments in Mexico.* (60) Beginning May 5.
Electrical Developments in Mexico.* (60) Beginning April 28.
Electrical Developments in Mexico.* (60) Beginning April 21.
Electrical Developments in Mexico.* (60) Beginning April 14.
Electrical Developments in Mexico.* (60) Beginning April 7.
Electrical Developments in Mexico.* (60) Beginning March 31.
Electrical Developments in Mexico.* (60) Beginning March 24.
Electrical Developments in Mexico.* (60) Beginning March 17.
Electrical Developments in Mexico.* (60) Beginning March 10.
Electrical Developments in Mexico.* (60) Beginning March 3.
Electrical Developments in Mexico.* (60) Beginning Feb. 25.
Electrical Developments in Mexico.* (60) Beginning Feb. 18.
Electrical Developments in Mexico.* (60) Beginning Feb. 11.
Electrical Developments in Mexico.* (60) Beginning Feb. 4.
Electrical Developments in Mexico.* (60) Beginning Jan. 28.
Electrical Developments in Mexico.* (60) Beginning Jan. 21.
Electrical Developments in Mexico.* (60) Beginning Jan. 14.
Electrical Developments in Mexico.* (60) Beginning Jan. 7.
Electrical Developments in Mexico.* (60) Beginning Dec. 31.
Electrical Developments in Mexico.* (60) Beginning Dec. 24.
Electrical Developments in Mexico.* (60) Beginning Dec. 17.
Electrical Developments in Mexico.* (60) Beginning Dec. 10.
Electrical Developments in Mexico.* (60) Beginning Dec. 3.
Electrical Developments in Mexico.* (60) Beginning Nov. 26.
Electrical Developments in Mexico.* (60) Beginning Nov. 19.
Electrical Developments in Mexico.* (60) Beginning Nov. 12.
Electrical Developments in Mexico.* (60) Beginning Nov. 5.
Electrical Developments in Mexico.* (60) Beginning Oct. 29.
Electrical Developments in Mexico.* (60) Beginning Oct. 22.
Electrical Developments in Mexico.* (60) Beginning Oct. 15.
Electrical Developments in Mexico.* (60) Beginning Oct. 8.
Electrical Developments in Mexico.* (60) Beginning Oct. 1.
Electrical Developments in Mexico.* (60) Beginning Sept. 24.
Electrical Developments in Mexico.* (60) Beginning Sept. 17.
Electrical Developments in Mexico.* (60) Beginning Sept. 10.
Electrical Developments in Mexico.* (60) Beginning Sept. 3.
Electrical Developments in Mexico.* (60) Beginning Aug. 27.
Electrical Developments in Mexico.* (60) Beginning Aug. 20.
Electrical Developments in Mexico.* (60) Beginning Aug. 13.
Electrical Developments in Mexico.* (60) Beginning Aug. 6.
Electrical Developments in Mexico.* (60) Beginning July 30.
Electrical Developments in Mexico.* (60) Beginning July 23.
Electrical Developments in Mexico.* (60) Beginning July 16.
Electrical Developments in Mexico.* (60) Beginning July 9.
Electrical Developments in Mexico.* (60) Beginning July 2.
Electrical Developments in Mexico.* (60) Beginning June 25.
Electrical Developments in Mexico.* (60) Beginning June 18.
Electrical Developments in Mexico.* (60) Beginning June 11.
Electrical Developments in Mexico.* (60) Beginning June 4.
Electrical Developments in Mexico.* (60) Beginning May 28.
Electrical Developments in Mexico.* (60) Beginning May 21.
Electrical Developments in Mexico.* (60) Beginning May 14.
Electrical Developments in Mexico.* (60) Beginning May 7.
Electrical Developments in Mexico.* (60) Beginning April 30.
Electrical Developments in Mexico.* (60) Beginning April 23.
Electrical Developments in Mexico.* (60) Beginning April 16.
Electrical Developments in Mexico.* (60) Beginning April 9.
Electrical Developments in Mexico.* (60) Beginning April 2.
Electrical Developments in Mexico.* (60) Beginning March 26.
Electrical Developments in Mexico.* (60) Beginning March 19.
Electrical Developments in Mexico.* (60) Beginning March 12.
Electrical Developments in Mexico.* (60) Beginning March 5.
Electrical Developments in Mexico.* (60) Beginning Feb. 27.
Electrical Developments in Mexico.* (60) Beginning Feb. 20.
Electrical Developments in Mexico.* (60) Beginning Feb. 13.
Electrical Developments in Mexico.* (60) Beginning Feb. 6.
Electrical Developments in Mexico.* (60) Beginning Jan. 30.
Electrical Developments in Mexico.* (60) Beginning Jan. 23.
Electrical Developments in Mexico.* (60) Beginning Jan. 16.
Electrical Developments in Mexico.* (60) Beginning Jan. 9.
Electrical Developments in Mexico.* (60) Beginning Jan. 2.
Electrical Developments in Mexico.* (60) Beginning Dec. 26.
Electrical Developments in Mexico.* (60) Beginning Dec. 19.
Electrical Developments in Mexico.* (60) Beginning Dec. 12.
Electrical Developments in Mexico.* (60) Beginning Dec. 5.
Electrical Developments in Mexico.* (60) Beginning Nov. 28.
Electrical Developments in Mexico.* (60) Beginning Nov. 21.
Electrical Developments in Mexico.* (60) Beginning Nov. 14.
Electrical Developments in Mexico.* (60) Beginning Nov. 7.
Electrical Developments in Mexico.* (60) Beginning Oct. 31.
Electrical Developments in Mexico.* (60) Beginning Oct. 24.
Electrical Developments in Mexico.* (60) Beginning Oct. 17.
Electrical Developments in Mexico.* (60) Beginning Oct. 10.
Electrical Developments in Mexico.* (60) Beginning Oct. 3.
Electrical Developments in Mexico.* (60) Beginning Sept. 26.
Electrical Developments in Mexico.* (60) Beginning Sept. 19.
Electrical Developments in Mexico.* (60) Beginning Sept. 12.
Electrical Developments in Mexico.* (60) Beginning Sept. 5.
Electrical Developments in Mexico.* (60) Beginning Aug. 29.
Electrical Developments in Mexico.* (60) Beginning Aug. 22.
Electrical Developments in Mexico.* (60) Beginning Aug. 15.
Electrical Developments in Mexico.* (60) Beginning Aug. 8.
Electrical Developments in Mexico.* (60) Beginning Aug. 1.
Electrical Developments in Mexico.* (60) Beginning July 25.
Electrical Developments in Mexico.* (60) Beginning July 18.
Electrical Developments in Mexico.* (60) Beginning July 11.
Electrical Developments in Mexico.* (60) Beginning July 4.
Electrical Developments in Mexico.* (60) Beginning June 27.
Electrical Developments in Mexico.* (60) Beginning June 20.
Electrical Developments in Mexico.* (60) Beginning June 13.
Electrical Developments in Mexico.* (60) Beginning June 6.
Electrical Developments in Mexico.* (60) Beginning May 30.
Electrical Developments in Mexico.* (60) Beginning May 23.
Electrical Developments in Mexico.* (60) Beginning May 16.
Electrical Developments in Mexico.* (60) Beginning May 9.
Electrical Developments in Mexico.* (60) Beginning May 2.
Electrical Developments in Mexico.* (60) Beginning April 25.
Electrical Developments in Mexico.* (60) Beginning April 18.
Electrical Developments in Mexico.* (60) Beginning April 11.
Electrical Developments in Mexico.* (60) Beginning April 4.
Electrical Developments in Mexico.* (60) Beginning March 28.
Electrical Developments in Mexico.* (60) Beginning March 21.
Electrical Developments in Mexico.* (60) Beginning March 14.
Electrical Developments in Mexico.* (60) Beginning March 7.
Electrical Developments in Mexico.* (60) Beginning Feb. 29.
Electrical Developments in Mexico.* (60) Beginning Feb. 22.
Electrical Developments in Mexico.* (60) Beginning Feb. 15.
Electrical Developments in Mexico.* (60) Beginning Feb. 8.
Electrical Developments in Mexico.* (60) Beginning Feb. 1.
Electrical Developments in Mexico.* (60) Beginning Jan. 25.
Electrical Developments in Mexico.* (60) Beginning Jan. 18.
Electrical Developments in Mexico.* (60) Beginning Jan. 11.
Electrical Developments in Mexico.* (60) Beginning Jan. 4.
Electrical Developments in Mexico.* (60) Beginning Dec. 28.
Electrical Developments in Mexico.* (60) Beginning Dec. 21.
Electrical Developments in Mexico.* (60) Beginning Dec. 14.
Electrical Developments in Mexico.* (60) Beginning Dec. 7.
Electrical Developments in Mexico.* (60) Beginning Nov. 30.
Electrical Developments in Mexico.* (60) Beginning Nov. 23.
Electrical Developments in Mexico.* (60) Beginning Nov. 16.
Electrical Developments in Mexico.* (60) Beginning Nov. 9.
Electrical Developments in Mexico.* (60) Beginning Nov. 2.
Electrical Developments in Mexico.* (60) Beginning Oct. 26.
Electrical Developments in Mexico.* (60) Beginning Oct. 19.
Electrical Developments in Mexico.* (60) Beginning Oct. 12.
Electrical Developments in Mexico.* (60) Beginning Oct. 5.
Electrical Developments in Mexico.* (60) Beginning Sept. 28.
Electrical Developments in Mexico.* (60) Beginning Sept. 21.
Electrical Developments in Mexico.* (60) Beginning Sept. 14.
Electrical Developments in Mexico.* (60) Beginning Sept. 7.
Electrical Developments in Mexico.* (60) Beginning Aug. 31.
Electrical Developments in Mexico.* (60) Beginning Aug. 24.
Electrical Developments in Mexico.* (60) Beginning Aug. 17.
Electrical Developments in Mexico.* (60) Beginning Aug. 10.
Electrical Developments in Mexico.* (60) Beginning Aug. 3.
Electrical Developments in Mexico.* (60) Beginning July 27.
Electrical Developments in Mexico.* (60) Beginning July 20.
Electrical Developments in Mexico.* (60) Beginning July 13.
Electrical Developments in Mexico.* (60) Beginning July 6.
Electrical Developments in Mexico.* (60) Beginning June 29.
Electrical Developments in Mexico.* (60) Beginning June 22.
Electrical Developments in Mexico.* (60) Beginning June 15.
Electrical Developments in Mexico.* (60) Beginning June 8.
Electrical Developments in Mexico.* (60) Beginning June 1.
Electrical Developments in Mexico.* (60) Beginning May 25.
Electrical Developments in Mexico.* (60) Beginning May 18.
Electrical Developments in Mexico.* (60) Beginning May 11.
Electrical Developments in Mexico.* (60) Beginning May 4.
Electrical Developments in Mexico.* (60) Beginning April 27.
Electrical Developments in Mexico.* (60) Beginning April 20.
Electrical Developments in Mexico.* (60) Beginning April 13.
Electrical Developments in Mexico.* (60) Beginning April 6.
Electrical Developments in Mexico.* (60) Beginning March 30.
Electrical Developments in Mexico.* (60) Beginning March 23.
Electrical Developments in Mexico.* (60) Beginning March 16.
Electrical Developments in Mexico.* (60) Beginning March 9.
Electrical Developments in Mexico.* (60) Beginning March 2.
Electrical Developments in Mexico.* (60) Beginning Feb. 24.
Electrical Developments in Mexico.* (60) Beginning Feb. 17.
Electrical Developments in Mexico.* (60) Beginning Feb. 10.
Electrical Developments in Mexico.* (60) Beginning Feb. 3.
Electrical Developments in Mexico.* (60) Beginning Jan. 27.
Electrical Developments in Mexico.* (60) Beginning Jan. 20.
Electrical Developments in Mexico.* (60) Beginning Jan. 13.
Electrical Developments in Mexico.* (60) Beginning Jan. 6.
Electrical Developments in Mexico.* (60) Beginning Dec. 30.
Electrical Developments in Mexico.* (60) Beginning Dec. 23.
Electrical Developments in Mexico.* (60) Beginning Dec. 16.
Electrical Developments in Mexico.* (60) Beginning Dec. 9.
Electrical Developments in Mexico.* (60) Beginning Dec. 2.
Electrical Developments in Mexico.* (60) Beginning Nov. 25.
Electrical Developments in Mexico.* (60) Beginning Nov. 18.
Electrical Developments in Mexico.* (60) Beginning Nov. 11.
Electrical Developments in Mexico.* (60) Beginning Nov. 4.
Electrical Developments in Mexico.* (60) Beginning Oct. 28.
Electrical Developments in Mexico.* (60) Beginning Oct. 21.
Electrical Developments in Mexico.* (60) Beginning Oct. 14.
Electrical Developments in Mexico.* (60) Beginning Oct. 7.
Electrical Developments in Mexico.* (60) Beginning Sept. 30.
Electrical Developments in Mexico.* (60) Beginning Sept. 23.
Electrical Developments in Mexico.* (60) Beginning Sept. 16.
Electrical Developments in Mexico.* (60) Beginning Sept. 9.
Electrical Developments in Mexico.* (60) Beginning Sept. 2.
Electrical Developments in Mexico.* (60) Beginning Aug. 26.
Electrical Developments in Mexico.* (60) Beginning Aug. 19.
Electrical Developments in Mexico.* (60) Beginning Aug. 12.
Electrical Developments in Mexico.* (60) Beginning Aug. 5.
Electrical Developments in Mexico.* (60) Beginning July 29.
Electrical Developments in Mexico.* (60) Beginning July 22.
Electrical Developments in Mexico.* (60) Beginning July 15.
Electrical Developments in Mexico.* (60) Beginning July 8.
Electrical Developments in Mexico.* (60) Beginning July 1.
Electrical Developments in Mexico.* (60) Beginning June 24.
Electrical Developments in Mexico.* (60) Beginning June 17.
Electrical Developments in Mexico.* (60) Beginning June 10.
Electrical Developments in Mexico.* (60) Beginning June 3.
Electrical Developments in Mexico.* (60) Beginning May 27.
Electrical Developments in Mexico.* (60) Beginning May 20.
Electrical Developments in Mexico.* (60) Beginning May 13.
Electrical Developments in Mexico.* (60) Beginning May 6.
Electrical Developments in Mexico.* (60) Beginning April 29.
Electrical Developments in Mexico.* (60) Beginning April 22.
Electrical Developments in Mexico.* (60) Beginning April 15.
Electrical Developments in Mexico.* (60) Beginning April 8.
Electrical Developments in Mexico.* (60) Beginning April 1.
Electrical Developments in Mexico.* (60) Beginning March 25.
Electrical Developments in Mexico.* (60) Beginning March 18.
Electrical Developments in Mexico.* (60) Beginning March 11.
Electrical Developments in Mexico.* (60) Beginning March 4.
Electrical Developments in Mexico.* (60) Beginning Feb. 26.
Electrical Developments in Mexico.* (60) Beginning Feb. 19.
Electrical Developments in Mexico.* (60) Beginning Feb. 12.
Electrical Developments in Mexico.* (60) Beginning Feb. 5.
Electrical Developments in Mexico.* (60) Beginning Jan. 29.
Electrical Developments in Mexico.* (60) Beginning Jan. 22.
Electrical Developments in Mexico.* (60) Beginning Jan. 15.
Electrical Developments in Mexico.* (60) Beginning Jan. 8.
Electrical Developments in Mexico.* (60) Beginning Jan. 1.
Electrical Developments in Mexico.* (60) Beginning Dec. 25.
Electrical Developments in Mexico.* (60) Beginning Dec. 18.
Electrical Developments in Mexico.* (60) Beginning Dec. 11.
Electrical Developments in Mexico.* (60) Beginning Dec. 4.
Electrical Developments in Mexico.* (60) Beginning Nov. 27.
Electrical Developments in Mexico.* (60) Beginning Nov. 20.
Electrical Developments in Mexico.* (60) Beginning Nov. 13.
Electrical Developments in Mexico.* (60) Beginning Nov. 6.
Electrical Developments in Mexico.* (60) Beginning Oct. 30.
Electrical Developments in Mexico.* (60) Beginning Oct. 23.
Electrical Developments in Mexico.* (60) Beginning Oct. 16.
Electrical Developments in Mexico.* (60) Beginning Oct. 9.
Electrical Developments in Mexico.* (60) Beginning Oct. 2.
Electrical Developments in Mexico.* (60) Beginning Sept. 25.
Electrical Developments in Mexico.* (60) Beginning Sept. 18.
Electr

Marine—(Continued).

The Use of Non-Ferrous Metals in Naval Machinery. George Goodwin. (Extract from paper read before Inst. of Metals.) (11) Mar. 12.
Navigating Ships in Trains.* Robert G. Skerrett. (46) Mar. 13.
Navires a "Pousseurs", Système Constan.* F. Pavy. (33) Feb. 7.
Le Bateau Pétrolier *San Fernando.** (33) Feb. 21.
Flotteurs en Béton Armé, système Christiane et Nielsen, pour le Renflouage des Navires.* (33) Feb. 21.
Versuche mit einer neuen Doppelschiffschraube.* H. Hass. (48) June 24, 1916.
Der Schiffsaufzug im Moldauhafen Prag-Holleschowitz.* H. Laras. (48) Nov. 25, 1916.
Die Wirkung der schweren Geschütze der Schiffsartillerie.* Hermann Narath. (48) Feb. 24, 1917.
Eine 200-pferdige Junkers-Maschine auf einem Kanalschlepper.* W. Scheller. (48) Serial beginning Mar. 31, 1917.

Mechanical.

Manufacture of Silica Brick.* H. Le Chatelier and B. Bogitch. (56) Vol. 60, 1919.
Die Castings, and Their Application to the War Program.* Charles Pack. (56) Vol. 60, 1919.
The Development of Airship Construction.* C. I. R. Campbell. (90) Vol. 61, 1919.
The Value of Proper Furnace Insulation.* A. W. Knight. (62) Feb.
Temperatures in Coke Ovens. (118) Feb.
The Air Cooling of Petrol Engines.* A. H. Gibson. (Paper read before Inst. of Automobile Engrs.) (11) Serial beginning Feb. 13.
The Vibration of Spars in Aircraft.* A. H. Stuart. (11) Feb. 13.
Winding Ropes and Bending Stresses.* O. Speer. (57) Feb. 13.
The Use of Fire-Clay in Laying Fire-Clay Bricks.* Raymond M. Howe. (66) Feb. 17.
Principles of Gas Combustion.* O. L. Kowalke. (4) Feb. 20.
The Design of Pneumatic Tired Trucks. C. M. McCreery. (Abstract of paper read before Soc. of Automotive Engrs.) (120) Serial beginning Feb. 26.
Large Concrete Oil Tanks Withstand Hurricane and Flood. (117) Mar.
Motor Fuels.* E. W. Dean. (3) Mar.
The First Transcontinental Motor Convoy.* E. R. Jackson (55) Mar.
Turbo-Compressor Calculations.* Allen H. Blaisdell. (55) Mar.
The Proper Balancing of Fuel, Lubricant and Motor.* William F. Parish. (55) Mar.
The Breakdown Voltage of a Spark Gap.* L. B. Loeb and F. B. Silsbee. (Abstract of report of National Advisory Committee for Aeronautics.) (19) Mar.
Propeller Testing Laboratory at McCook Field.* F. W. Caldwell. (From *Aerial Age.*) (19) Mar.
Firing Steam Boilers without Flame.* William A. Bone and P. St. G. Kirke. (From *Journal* of Soc. of Chemical Industry.) (19) Mar.
Heat Treating Cast Steel for Tractors.* Fred. Grotto. (62) Mar.
Adaptability of the Forging Machine. F. H. Blakeslee. (62) Serial beginning Mar.
Recent Welding and Cutting Developments.* R. M. Rush. (116) Mar.
Heat Treatment of Automobile Springs. Harry E. Hemstreet. (From paper read before Am. Steel Treaters' Convention.) (62) Mar.
Steam-Turbine Lubrication.* W. F. Osborne. (64) Mar. 2.
Four-Day Test on Five Oneida Street Boilers Burning Pulverized Coal. (64) Mar. 2.
Pulverized Coal Under Central-Station Boilers.* John Anderson. (64) Mar. 2; (27) Mar. 13.
Elements of Combustion of Fuel Oil. (64) Mar. 2.
Notes on Gasification.* Charles F. Tooby. (Paper read before Junior Gas Assoc.) (66) Mar. 2.
Gas Boosting.* D. Balfour Bain. (Paper read before Junior Gas Assoc.) (66) Mar. 2.
Pumping Acid with Compressed Air.* John Oliphant. (105) Mar. 3.
Colliery Boiler Plant Satisfactorily Burns No. 2 Tank Barley.* D. C. Ashmead. (45) Mar. 4.
Driving Air Compressors by Exhaust Steam. A. Dessemond. (57) Serial beginning Mar. 5.
Flying Boats—The Form and Dimensions of Their Hull.* G. S. Baker. (Paper read before the North-East Coast Inst. of Engrs. and Shipbuilders.) (11) Mar. 5.
A Steam Alignment Diagram.* D. Halton Thomson. (11) Mar. 5.
Ford Uses Large Refrigeration Plant in Making Automobiles.* Eric H. Peterson. (64) Mar. 9.
Standardization of Boiler Plants.* Louis R. Lee. (64) Mar. 9.

* Illustrated.

Marine—(*continued*).

The Use of Non-Ferrous Alloys in Naval Machinery. George Goodwin. (Extract from Paper read before Inst. of Metals.) (11) Mar. 12.

Propelling Ships in Trains.* Builder (2 Papers). (18) Mar. 12.

Service a Pneumatic Combustion.* P. Frye. (11) F.P. 7.

Le Bateau Portatif pour Aeroscafe.* (12) Feb. 21.

Schiffbau. (23) Feb. 12.

Die Wirkung des schweren Geschützes der Schlachtschiffe.* Hermann Nordik. (46) Feb. 22. (17).

Neue Schiffsbau- und neue Dampfmaschinenanlagen.* H. Blum. (46) June 24, 1918. Die Schiffsanlage für Dieselmotor Propellerturbinen.* H. Lorenz. (46) Nov. 20, (19).

Die Wirkung des schweren Geschützes der Schlachtschiffe.* Hermann Nordik. (46) Feb. 22, (17).

Neue Schiffsbau- und neue Dampfmaschinenanlagen.* W. Schuller. (46) Serial beginning Nov. 21, 1917.

Mechanical.

Manufacture of Pillow Blocks.* H. Le Chevalier and H. Hopkins. (30) Vol. 60, 1919.

Die Castings and Their Application in the War Program.* Charles Pack. (80) Vol. 60, 1919.

The Investigation of Airship Construction.* C. I. R. Campbell. (20) Vol. 83, 1919.

The Value of Power Normal Insulators.* A. W. Kinzbr. (82) Feb.

Temperatures in Oil-Tube Tests.* H. H. Odeon. (Paper read before Inst. of The Air Cooling of Cylinder Engines.* A. H. Gibson. (11) Feb. 12.

Automobile Notes.* (11) Extra Engineer Feb. 12.

The Vibration of Shafts in Air.* A. H. Gibson. (11) Feb. 12.

Working Stress and Bending Stresses.* C. Shore. (82) Feb. 12.

The Use of Pipe-Clay in Laying Pipe-Clay Bricks.* Reprinted M. Howe. (60) Feb. 12.

Problems of Gas Combustion.* O. L. Kowalke. (4) Feb. 20.

The Design of Locomotive Fire Tubes.* C. M. McCrory. (Abstract of paper read before Soc. of Automotive Engrs.) (120) Serial beginning Feb. 20.

Large Concrete Oil Tanks Withstand Earthquake and Flood. (117) Mar.

Water Power.* E. W. Dean. (11) Mar.

The Pipe Tobacco-Cured Motor Cooperage.* C. H. Jackson (32) Mar.

Carburetion.* Alton D. Blaisdell. (55) Mar.

The Proper Hardening of Tool Lubricant and Motor.* William P. Parish. (38) Mar.

The Production, Volume of a Gross Loss.* L. B. Lamb and C. O. Bilbow. (Abstract of Paper read before Institute of Electrical Engineers) (10) Mar.

Propeller Testing Laboratory at Bucknell Field.* P. W. Stewart. (From Aerial Age.) (19) Mar.

Tuning Steam Boilers without Flame.* Williams A. Thom and P. St. G. Kirke (From Journal of Soc. of Chemical Industry.) (19) Mar.

Heat Treating Cast Steel for Tractors.* Prof. Diehl. (62) Mar.

Adaptability of the Rotating Machine. F. H. Bleakley. (82) Serial beginning Mar.

Reverse Welding and Cutting Apparatus.* H. M. Hobs. (116) Mar.

Diesel Tractors of Automobile Engine. Harry E. Hedstrom. (From Paper read before Soc. of Automotive Engrs.) (45) Mar.

Steam-Turbine Lubrication.* W. P. Cummins. (45) Mar. 2.

Power-Dry Test on Five Double Screw Steam Dollars Diverse Colorized Coal. (64) Mar. 2.

Pulverized Coal Under Central-Station Boilers.* John Anderson. (44) Mar. 2) Mar. 2.

Economic Development of Fuel Oil. (45) Mar. 2.

Notes on Combustion.* (Course 2, Prob). (Paper read before Junior Gas Assoc.) (60) Mar.

One Invention.* H. Palmer Lenz. (Paper read before Junior Gas Assoc.) (60) Mar. 2.

Pumping Acid with Compressed Air.* John Gilpatrick. (105) Mar. 2.

Colliery Boiler Plant Installations Burns No. 2 Tank Burns.* D. C. Ashmead. (45) Mar. 2.

Driving Air Compressors by Induction Motor. A. Dennewood. (32) Serial beginning Mar. 2.

Piping Plants—The Prop and Dimensions of Tank Plant.* C. B. Baker. (Paper read before the North-East Coast Inst. of Engrs. and Shipbuilders.) (11) Mar. 2.

A Steam Alignment Engine.* O. Helen Thomson. (11) Mar. 5.

Ford Uses Large Motor-Testing Plant to Making Automobile.* Eric H. Pederson. (45) Mar. 6.

Standardization of Dairy Plants.* Louis E. Lee. (84) Mar. 6.

* Illustrated.

Mechanical—(Continued).

Design and Construction of Power-Plant Piping. John D. Morgan. (64) Mar. 9.
Brazing Steel Tubes and Sheets.* (72) Mar. 11.
A Study of the Methods and Operations of Japanning Practice. W. A. Darrah. (120) Serial Beginning Mar. 11.
Coal Washing: Further Scientific Studies.* Thomas James Drakeley. (Abstract of paper read before Manchester Geological and Min. Soc.) (57) Serial beginning Mar. 12.
The Development of Metal Construction in Aircraft.* J. S. Nicholson. (Paper read before Inst. of Engrs. and Shipbuilders in Scotland.) (11) Serial beginning Mar. 12.
How Bituminous Coal Can Be Safely Stored.* H. H. Stock. (45) Mar. 18.
Handling Wet Sand From a Hopper.* Howard H. George. (17) Mar. 20.
Double Pipe Heat Interchangers.* George A. Richter. (Paper read before Am. Inst. of Chemical Engrs.) (105) Mar. 24.
Reading's Storage Yards Keep the Mines Running Steadily.* Dever C. Ashmead. (45) Mar. 25.
The Design and Construction of the 183-Cu. In. Engine.* S. Gerster and W. F. Bradley. (120) Serial beginning Mar. 25.
The Plowing Speeds of Tractors and the Variables Involved.* Oliver B. Zimmerman. (Paper read before Soc. of Automotive Engrs.) (120) Mar. 25.
An Oil Engine Installation in New Mexico.* Theodore M. Robie. (16) Mar. 27.
Air-Compressor Lubrication. W. F. Osborne. (64) Mar. 30.
Automatic Control for Motors Driving Pumps and Compressors.* B. W. Jones. (64) Mar. 30.
Measuring Flow of Fluids.* Jacob M. Spitzglass. (64) Mar. 30.
Les Régimes Lents, en Aviation.* Auguste Forissier. (33) Feb. 21.
Ueber die Ungleichmässigkeit des Drahtes von Papiergarnen auf den Tellerspinnmaschinen.* Wilh. Heinke. (48) Mar. 25, 1916.
Wirkungsgrad und Beschaufelung von Turbo-kompressoren und Gebläsen.* H. Baer. (48) Serial beginning Mar. 25, 1916.
Dampf-Charakteristiken.* Bruno Leinweber. (48) Apr. 29, 1916.
Die Berechnung verschiedener Rohrnetze auf einheitlicher Grundlage.* K. Brabbée. (48) Serial beginning May 27, 1916.
Untersuchungen über den Verlauf der Verbrennung im Dieselmotor.* Erich Weisshaar. (48) Apr. 1, 1916.
Ueber die Aufarbeitung des Braunkohlen-Generatorteeres'. Franz Fischer und Wilhelm Schneider. (50) June 8, 1916.
Seilbahnkrane neuerer Bauart.* G. W. Heinold. (48) Serial beginning June 10, 1916.
Kohlenbrechanlage und Koksaufbereitung des neuen Zentralgaswerkes in Budapest.* Wilhelm Seitner. (48) June 10, 1916.
Drucktafel für Erdgas.* Dönät Bánki. (48) June 17, 1916.
Ueber den Einfluss des Wasserdampfgehaltes in Gasbetrieben.* E. Hofmann. (50) Serial beginning June 22, 1916.
Die Oberflächenkondensation des Wasserdampfes.* Wilhelm Nusselt. (48) Serial beginning July 1, 1916.
Langhübige oder kurzhübige Dieselmotoren? W. Stremme. (48) Serial beginning July 8, 1916.
Schwingungs- und Resonanzerscheinungen in den Rohrleitungen von Kolbengebläsen.* W. Borth. (48) Serial beginning July 8, 1916.
Schiebebühnen mit elektrischem Antrieb.* Herm. Thieme. (48) July 15, 1916.
Die thermischen Eigenschaften der einfachen Gase und der technischen Feuergase zwischem 0° und 3 000° C.* W. Schüle. (48) Serial beginning July 29, 1916.
Zur Frage der Erweiterung der Düsen von Dampfturbinen.* H. Baer. (48) Serial beginning Aug. 5, 1916.
Die Dämpfung am mittelbar wirkenden Geschwindigkeitsregler für Kraftmaschinen.* Otto Moog. (48) Serial beginning Aug. 12, 1916.
Kohlenverfeinerung und Kohlenstaubfeuerung.* Emil Riisager. (50) Aug. 17, 1916.
Die Verwendung von gestücktem Koks zur Dampferzeugung.* Alfred Stober. (50) Aug. 24, 1916.
Die Verwendung der Zoelly-Leiträder von Dampfturbinen für überkritische Dampfgeschwindigkeiten.* A. Loschge. (48) Serial beginning Sept. 16, 1916.
Der Torsiograph, ein neues Instrument zur Untersuchung von Wellen.* Jos. Geiger. (48) Serial beginning Sept. 30, 1916.
Untersuchungen über die Wirkung von Einlagekörpern in den Rauchröhren von Lokomobilkesseln. B. Hilliger. (48) Serial beginning Oct. 21, 1916.
Ueber die Verladung und Förderung von Hüttenkoks mit mechanischen Fördermitteln.* Hans Hermann Dietrich. (50) Serial beginning Nov. 2, 1916.
Erfahrungen im Bau und Betrieb hochbeanspruchter Dampfkessel.* Friedrich Münzinger. (48) Serial beginning Nov. 11, 1916.
Die Verwertung der Abwärme von Brennkraftmaschinen für Kraftwecke.* Wilhelm Gentsch. (48) Serial beginning Nov. 25, 1916.

---

* Illustrated.

Mechanical.—(Continued).

* Illustrated.

Mechanical—(Continued).

Die Antriebverhältnisse des Einblaseventiles der Dieselmaschine.* Koenemann. (48) Serial beginning Dec. 2, 1916.
Untersuchungen eines Wechselgetriebes mit $n + 1$ — Räden für n — Uebersetzungen.* Hans Hermann. (48) Dec. 23, 1916.
Ueber die Ermüdung von Maschinenteilen.* Alfons Leon. (48) Serial beginning Mar. 3, 1917.
Ueber die restlose Vergasungder Kohle im Doppelgasserzeuger von Strache.* Heinrich Stähler. (50) Mar. 22, 1917.
Brennstoff und Verbrennungsvorgang. Aufhäuser. (48) Mar. 24, 1917.
Das Hobeln von Pfeilrädern auf der Sykes-Zahnradhobelmaschine.* E. Toussaint. (48) Apr. 7, 1917.
Die heutige Stand der Kohlenforschung.* Franz Fischer. (50) Serial beginning Apr. 12, 1917.
Elektrische Zugwagen für Lastbeförderung.* Berlit. (48) Apr. 28, 1917.
Der Nutzen elastischer Kupplung von Kraft- und Arbeitsmaschine.* Kurt Neumann. (48) Serial beginning May 5, 1917.
Die Deutsche Luftkriegsbeute-Ausstellung (Delka).* A. Baumann. (48) June 2, 1917.
Einketten- und Einseilgreifer.* A. Boje. (48) June 16, 1917.
Kurvenkreisel und Kollergang.* R. Grammel. (48) July 7, 1917.
Die Wärmeübergang im Rohr. Wilhelm Nusselt. (48) Aug. 18, 1917.
Zur Verfeuerung minderwertiger, schlackenreicher Feinkohle auf Wanderrosten.* A. Loschge. (48) Serial beginning Sept. 1, 1917.
Zur Thermodynamik des Wasserdampfes.* G. Eichelberg. (48) Sept. 8, 1917.
Versuche zur Verbrennung von Koksgrus auf Unterwind-Wanderrosten.* Otto Wirmer. (48) Oct. 6, 1917.
Einiges über Festpunkte und Ausgleichvorrichtungen für Dampfrohrleitungen. H. Ochwat. (48) Serial beginning Oct. 13, 1917.
Zur Beurteilung der Leitvorrichtungen von Dampfturbinen bei Ueberschallgeschwindigkeit.* G. Zerkowitz. (48) Serial beginning Oct. 27, 1917.
Vereinheitlichung der Werkzeugbefestigungen.* Th. Damm. (48) Oct. 27, 1917.
Die Temperaturregelung des Heissdampfes.* Heinrich Huebner. (48) Serial beginning Nov. 3, 1917.
Die Bemessung der Federn für pendelnde Massen.* Georg Lindner. (49) Nov. 10, 1917.
Untersuchungen über Wirkung und Anwendung von Pendeln und Pendelketten im Maschinenbau.* K. Kutzbach. (48) Serial beginning Nov. 17, 1917.
Bericht über die Untersuchung einer aufgerissen Wasserkammer.* Richard Baumann. (48) Serial beginning Dec. 1, 1917.
Beobachten und Messen.* O. Herre. (48) Serial beginning Dec. 1, 1917.
Neuerungen an Mikromanometern.* (48) Dec. 8, 1917.
Ueber Reibung.* D. Thoma. (48) Dec. 29, 1917.
Maschinelle Schnellverstellung der Werkzeuge an modernen Grosswerkzeugmaschinen.* Arthur Schmidt. (48) Apr. 21, 1919.
Petroleumbetrieb bei Motorwagen.* A. Heller. (48) Aug. 16, 1919.

Metallurgical.

Standards for Brass and Bronze Foundries and Metal-Finishing Processes.* Lillian Erskine. (Foundry sanitation.) (56) Vol. 60, 1919.
Practice of Antimony Smelting in China.* Chung Tu Wang. (56) Vol. 60, 1919.
First Year of Leaching by the New Cornelia Copper Co.* Henry A. Tobelmann and James A. Potter. (56) Vol. 60, 1919.
Fine-Grinding Cyanide Plant of Barnes-King Development Co.* J. H. McCormick. (56) Vol. 60, 1919.
Automatic Separation of Solution from Solids in Hydrometallurgical Treatment of Ore Pulps.* Bernard MacDonald. (56) Vol. 60, 1919.
Effect of Oxygen on Precipitation of Metals from Cyanide Solutions. Thomas B. Crowe. (56) Vol. 60, 1919.
Roasting for Amalgamating and Cyaniding Cripple Creek Sulfotelluride Gold Ores.* A. L. Blomfield and M. J. Trott. (56) Vol. 60, 1919.
Manufacture of Silica Brick.* H. Le Chatelier and B. Bogitch. (56) Vol. 60, 1919.
A Symposium on the Conservation of Tin.* (56) Vol. 60, 1919.
Constitution of Tin Bronzes.* Samuel L. Hoyt. (56) Vol. 60, 1919.
Electrolytic Zinc.* C. A. Hansen. (56) Vol. 60. 1919.
Electrostatic Precipitation.* O. H. Eschholz. (56) Vol. 60. 1919.
Condensation of Zinc from its Vapor.* Charles H. Fulton. (56) Vol. 60, 1919.
Effect of Impurities on Hardness of Cast Zinc or Spelter.* G. C. Stone. (56) Vol. 60, 1919.
Oxygen and Sulfur in the Melting of Copper Cathodes.* Stanislaus Skowrouski. (56) Vol. 60, 1919.
Relation of Sulfur to the Overpoling of Copper.* Stanislaus Skowrouski. (56) Vol. 60, 1919.

* Illustrated.

Mechanical.—(Continued).

* Illustrated.

Metallurgical—(Continued).

Action of Reducing Gases on Hot Solid Copper.* Norman B. Pilling. (56) Vol. 60, 1919.

Spectroscopic Determination of Lead in Copper.* C. W. Hill and G. P. Luckey. (56) Vol. 60, 1919.

Volatilization of Cuprous Chloride on Melting Copper Containing Chlorine.* S. Skowrouski and K. W. McComas. (56) Vol. 60, 1919.

Non-Metallic Inclusions in Bronze and Brass.* G. F. Comstock. (56) Vol. 60, 1919.

Manganese Bronze.* P. E. McKinney. (56) Vol. 60, 1919.

Automatic Copper Plating.* Joseph W. Richards. (56) Vol. 60, 1919.

Volatility of Constituents of Brass.* John Johnstone. (56) Vol. 60, 1919.

A Comparison of Grain-Size Measurements and Brinell Hardness of Cartridge Brass.* W. H. Bassett and C. H. Davis. (56) Vol. 60, 1919.

Babbitt and Babbitted Bearings.* Jesse L. Jones. (56) Vol. 60, 1919.

Metals and Alloys from a Colloid-Chemical Viewpoint. (56) Vol. 60, 1919.

Effect of Temperature, Deformation, and Grain Size on the Mechanical Properties of Metals.* Zay Jeffries. (56) Vol. 60, 1919.

Metallography of Tungsten.* Zay Jeffries. (56) Vol. 60, 1919.

Metallographic Phenomena Observed in Amalgams.* Arthur W. Gray. (56) Vol. 60, 1919.

Two Instances of Mobility of Gold in Solid State.* Edward Keller. (56) Vol. 60, 1919.

Radium.* Richard B. Moore. (56) Vol. 60, 1919.

Nickel-Chromium Alloys. W. A. Gatward. (58) Dec., 1919.

The Dominion Forge Plant at Walkerville.* (62) Feb.

Selection of Heat Treating Equipment.* Alvin N. Conarroe. (62) Feb.

The Manufacture of High Speed Steel. Roy C. M'Kenna. (Paper read before Steel Treaters' Soc.) (62) Serial beginning Feb.

The Heat Treatment of Drop Forgings.* Leslie Aitchison. (62) Serial beginning Feb.

The Sorbitic Treatment of Steel.* James Waite. (From paper read before Technical Inspection Assoc.) (22) Feb. 20.

Sulphur in the Acid Open-Hearth Process. F. A. Matthewman. (22) Feb. 20.

The Treatment of Steel. James Waite. (Abstract of paper read before Technical Inspection Assoc.) (21) Mar.

The Hump Method for Heat Treating Steel.* (62) Mar.; (116) Mar.

Notes on Quenching Stresses and Failures. Francis B. Coyle. (62) Mar.

Electric Furnaces for Heat Treatment.* R. E. Talley. (From paper read before Steel Treating Research Soc.) (62) Serial beginning Mar.

The Effect of Nitrogen on Steel.* George F. Comstock and W. E. Reeder. (105) Mar. 3.

Metallographical Study on Galvanized Steel.* Y. Taji. (Paper read before the Soc. of Naval Architects, Japan.) (11) Mar. 5.

The Requirements of Refined Copper.* Lawrence Addicks. (105) Mar. 10.

Pots and Boxes Used in Carbonizing.* H. H. Harris. (From paper read before Am. Steel Treaters' Soc.) (20) Mar. 11.

Position of Tensile Tests in the Foundry.* W. A. Gibson. (20) Mar. 11.

The Action on Aluminium of Hard Industrial Waters. Richard Seligman and Percy Williams. (Paper read before Inst. of Metals.) (11) Mar. 12.

Magnetic Separation of Bismuth, Tin, and Tungsten Concentrates in Tasmania. Wm. E. Hitchcock and J. R. Pound. (103) Mar. 13.

Making Lithopone at Collinsville, Ill.* Chester H. Jones. (105) Mar. 17.

A Classification of Filter Plates and Frames and Their General Usage.* D. R. Sperry. (105) Mar. 17.

Aluminum Rolling-Mill Practice.* Robert J. Anderson and Marshall B. Anderson. (105) Serial beginning Mar. 17.

Effect of Molybdenum in Chrome and Nickel Steels.* (15) Mar. 19.

Selective Flotation by the Bradford Process. (16) Mar. 20.

Electrolytic Zinc Plant of the Judge Mining and Smelting Co.* L. W. Chapman. (105) Mar. 24.

A Modification of Horwood's Process for the Treatment of Copper-Zinc Ores.* H. L. Hazen. (103) Mar. 27.

Crystallography of Alpha and Beta Iron.* Federico Giolitti. (105) Mar. 31.

The Effect of Molybdenum in Alloy Steels. (25) April.

Essais d'Organisation Méthodique dans une Usine Métallurgique.* M. G. Charpy. (92) May–June, 1919.

Die Eisenindustrie in Belgien.* Robert Kind. (50) Serial beginning May 4, 1916.

Die Bedeutung des Kaltwalzen bei Sonderbiechen.* W. Krämer. (50) May 4, 1916.

Der Wärmehaushalt des Hochofens, die Reduktionsziffer von Eisenerzen und die Vorausbestimnung des Brennstoffverbrauchs. Bernhard Osann. (50) Serial beginning May 18, 1916.

Einige Versuche mit Kaltgezogenem und wieder angelassenem Flusseisen.* O. Bauer. (50) Serial beginning May 18, 1916.

---

* Illustrated.

Metallurgical—(Continued).

Beitrag zur Theorie des Temperprozesses.* Rudolf Stotz. (50) May 25, 1916.
Der Umbau des Thomasstahlwerks des Lothringer Hüttenvereins Aumetz-Friede in Kneuttingen.* (50) June 1, 1916.
Einfluss wiederholter Bearbeitung von Walzstäben in der Richtmaschine. Paul Zetzsche. (50) June 8, 1916.
Neue Verwendung der Gichtgase.* W. Zimmerman. (50) June 15, 1916.
Die Metaligiesserei in den Vereinigten Staaten.* B. Neumann. (50) June 29, 1916.
Die Bestimmung von Chrom im Ferrochrom.* Wilh. Herwig. (50) July 6, 1916.
Die englische Eisenindustrie vor, unter und nach dem Kriege. Walter Daelen. (50) Serial beginning July 13, 1916.
Untersuchungen über die Vorgänge im Hochofen.* W. Mathesius. (50) Serial beginning July 20, 1916.
Herstellung metallischer Ueberzüge auf Flusseisen- und Stahldrähten inbesondere deren Verzinkung und Verzinnung. H. Altpeter. (50) Serial beginning Aug. 3, 1916.
Ueber neuere Aetzmittel zur Ermittlung der Verteilung des Phosphors in Eisen und Stahl. P. Oberhoffer. (50) Aug. 17, 1916.
Neuere Ausführungen von Roheisenwagen.* (50) Aug. 17, 1916.
Hüttenwerkskrane.* Leopold Feigl. (48) Serial beginning Aug. 19, 1916.
Der Körnungsgrad und die physikalischtechnischen Eigenschaften der Metalle.* J. Czochralski. (50) Sept. 7, 1916.
Kaltwalzmaschinen.* (48) Sept. 16, 1916.
Kontinuierliche Walzwerke. H. Illies. (50) Sept. 21, 1916.
Einwirkung der Temperatur auf die Biegefähigkeit von Flusseisen-und Kupferdrähten.* Lautz. (48) Sept. 23, 1916.
Zur Metallurgie des Gusseisens. (50) Serial beginning Sept. 28, 1916.
Berechnung der in den Hochofen eingeführten Windmenge und der Zusammensetzung der Gichtgase.* Bernhard Osann. (50) Oct. 12, 1916.
Neuerungen an Ventilanlagen für Siemens-Martin-Oefen.* H. Hermanns. (48) Oct. 21, 1916.
Ein neuzeitliches Giesserei-Laboratorium.* Rudolf Stotz. (50) Oct. 26, 1916.
Betrachtungen über Turbo-Gebläse für Hochofenbetrieb und die Zweckmassigkeit ihrer Anwendung.* C. B. Blauel. (50) Serial beginning Nov. 9, 1916.
Neuerungen im Thomasverfahren. O. Thiel. (50) Serial beginning Nov. 16, 1916.
Theory der Entschwefelungsvorgänge im Roheisenmischer. L. Blum. (50) Nov. 23, 1916.
Ueber Rohölfeuerungen in Hüttenwerken.* L. Schweitzer. (50) Dec. 7, 1916.
Die erste Anwendung der Wasserkraft im Hüttenwesen. Otto Johannsen. (50) Dec. 21, 1916.
Ueber die Verwendung von Koks in Gaserzeugern für Martinöfen.* H. Markgraf. (50) Dec. 28, 1916.
Vergleichsversuche an einem Winderhitzer mit gewöhnlicher und mit Pfoser-Strack-Stumm-Beheizung.* A. Pfoser. (50) Serial beginning Jan. 11, 1917.
Ueber die Wärmebilanz eines zum Einschmelzen von Ferromangan benutzen Nathusius-Ofens.* F. Bittner. (50) Jan. 18, 1917.
Der neue Giessereianlage der Maschinenfabrik Esslingen.* E. Leber. (50) Serial beginning Jan. 25, 1917.
Der Einfluss des Herstellungsverfahrens und die Walzrichtung auf die Eigenschaften verschieden stark gewalzter Kupferbleche.* W. Müller. (48) Jan. 27, 1917.
Faber du Faurs Arbeiten und Erfindungen auf dem Gebiet der Winderhitzung und Gasfeuerung.* Eduard Herzog. (50) Serial beginning Feb. 1, 1917.
Rechnerische Betrachtungen über den Verbrauch von Kohlenstoff in neuzeitlichen amerikanischen Hochöfen.* W. Mathesius. (50) Serial beginning Feb. 15, 1917.
Die Rentabilität der Eisen-und Stahlgiessereien unter besonderer Berücksichtigung einer neueren Akkordlohnbestimmung.* A. Wiedemann. (50) Feb. 22, 1917.
Manganbestimmung in Eisen und Stahl nach dem Wismutatverfahren.* H. Kinder. (50) Mar. 1, 1917.
Zur Vermeidung des Oberfeuers beim Hochofenbetrieb und Gewinnung von Zyankalium als Nebenerzeugnis.* Fr. Lange. (50) Mar. 15, 1917.
Veränderung der Korngrösse und der Korngliederung in Metallen.* J. Czochralski. (48) Apr. 21, 1917.
Metallographische Forschungen im Giessereiwesen.* J. P. Arend. (50) Apr. 26, 1917.
Lose Blätter aus der Geschichte des Eisens.* Otto Vogel. (50) Serial beginning Apr. 26, 1917.
Die Entwicklung der Thomasschlackenmühlen.* K. Rech. (50) May 17, 1917.
Beitrage über die Verhüttung der Siegerländer Rostspate im Hochofenbetrieb. R. Cordes. (50) May 24, 1917.
Ueber den Einfluss des Silizuims und der Glühdauer auf die mechanisch-physikalischen Eigenschaften des schmiedbaren Gusses.* E. Leuenberger. (50) Serial beginning May 31, 1917.
Ueber den Koksverbrauch im Hochofen. Oskar Simmersbach. (50) June 14, 1917.

* Illustrated.

Metallurgical—(Continued).

Umsetzen von Hochöfen.* Oskar Simmersbach. (50) June 21, 1917.
Die Härte der technisch wichtigsten Legierungen.* P. Ludwik. (48) June 30, 1917.
Die mannigfache und vielgestaltige Anwendung des elektrischen Antriebes bei den wichtigsten Hebe-und Transportvorrichtungen im Stahlwerk. Wintermeyer. (48) Serial beginning Aug. 4, 1917.
Stripperkrane.* Martell. (48) Aug. 25, 1917.

Military.

Engineer Construction in France.* J. A. Woodruff. (100) Jan.-Feb.
Three Bridges in Palestine Built by Canadians.* A. P. Linton. (96) Feb. 26.
The Work of the Construction Division of the United States Army from Coast to Coast, 1917-1919.* E. B. Morden. (2) Mar.
Military Mining in France.* Alfred H. Brooks. (16) Mar. 6.
The Work of a Sanitary Section with the B. E. F., France.* Osmond Cattlin. (114) Mar. 13.
Die Herstellung von Geschosshüllen in amerikanischen und kanadischen Werkstätten.* (50) June 8, 1916.
Die Herstellung von Graugussgranaten in französischen Giessereien.* Fr. Westhoff. (50) July 27, 1916.
Ballistik; die mechanischen Grundlagen der Lehre vom Schuss.* H. Lorenz. (48) Serial beginning July 29, 1916.
Selbstladegewehre.* Polster. (48) Serial beginning Sept. 30, 1916.
Die Wirkung der schweren Geschütze der Schiffsartillerie.* Hermann Narath. (48) Feb. 24, 1917.
Verwendung von Kriegsgefangenen 1870/71 und 1866. Arnold Woltmann. (50) June 21, 1917.

Mining.

Elko Prince Mine and Mill.* J. U. N. Dorr and L. D. Dougan. (56) Vol. 60, 1919.
Prevention of Illness Among Employees in Mines. A. J. Lanza. (56) Vol. 60, 1919.
The Applications of Ferro-Concrete in Mines.* (106) Feb.
A Lecture on Miners' Nystagmus. T. Lister Llewellyn. (106) Feb.
Electricity in Tin Mining.* D. M. W. Hutchison and W. J. Wayte. (77) Feb.
Lighting Conditions in Mines.* T. Lister Llewellyn. (Abstract of paper read before Illuminating Eng. Soc.) (22) Feb. 27.
Use of Magnesia Cement as a Protection for Timbers. W. C. Phalen. (For Mines.) (117) Mar.
Blasting Concrete.* S. R. Russel. (67) Mar.
Installation of a Shaft Cable at Kirkby Colliery.* Joseph Bircumshaw. (Paper read before Midland Counties Inst. of Engrs.) (22) Mar. 5; (57) Mar. 5.
Military Mining in France.* Alfred H. Brooks. (16) Mar. 6.
Recovery of Caved Stopes.* Douglas La. (16) Mar. 6.
Failure of Mine Timbers.* George J. Young. (16) Mar. 6.
Simultaneously Working the Superimposed Coal Beds of Virginia.* Donald J. Baker. (45) Mar. 11.
How an Anthracite Breaker Was Remodeled.* Dever C. Ashmead. (45) Serial beginning Mar. 11.
Electric Winding Engines and Mine Hoists.* H. H. Broughton. (73) Serial beginning Mar. 12.
Thawing Frozen Gravel with Cold Water.* Walter S. Weeks. (For Mines.) (103) Mar. 13.
Electric Service in Illinois Coal Mine.* H. W. Eales. (27) Mar. 20.
Oil Well Pumping Methods and Equipment.* Seth S. Langley. (16) Mar. 27.

Miscellaneous.

Scientific Basis for Cost Accounting. G. Charter Harrison. (9) Mar.
Fixed-Fee Contract for Building Construction. F. A. Wells. (Paper read before Associated General Contractors of America.) (117) Mar.
Owner Protection in Building Construction.* F. A. Wells. (67) Mar.
Contract Clauses Which Disregard the Square Deal. F. J. Herlihy. (13) Mar. 4.
Ethyl Alcohol from Coke Oven Gas. (24) Mar. 6.
The Distillation of Shale-Oil. James A. Bishop. (103) Mar. 13.
Commercial Development of Fused Silica.* John Scharl and Wallace Savage. (105) Mar. 31.
Essai d'Application du Système Taylor dans un grand Etablissement d'Etat. (Poudrerie du Ripault).* E. Nusbaumer. (92) May–June, 1919.
Pratique de la Réorganisation Administrative des Enterprises Industrielles.* Paul Lecler. (92) May-June, 1919.
Die Verträge mit Angehörigen des feindlichen Auslandes.* Fuld. (50) May 11, 1916.

* Illustrated.

Metallurgical—(Continued).

Mining.

Miscellaneous.

---

* Illustrated.

Miscellaneous—(Continued).

Deutschlands Steinkohlenvorkommen mit besonderer Berücksichtigung der Kokskohlen.* Oskar Simmersbach. (50) Serial beginning Sept. 14, 1916.
Die Rechtsentwicklung auf dem Gebiete des Gewerbe-, Handels-, Nachbar-, Verkehrs- und Wasserrechts der Grossindustrie in den Jahren 1914 und 1915. Schmidt-Ernsthausen. (50) Serial beginning Oct. 5, 1916.
Bedeutung und Ausbau der Unterkunftsfürsorge für alleinstehende Berg- und Hüttenarbeiter. Friederich Raefler. (50) Oct. 19, 1916.
Die Zusammenhänge zwischen Mathematik und Technik und die Frage ihrer Weiterentwicklung. Conrad Müller. (48) Oct. 21, 1916.
Werner von Siemens und die Eisenindustrie. Otto Vogel. (50) Serial beginning Dec. 14, 1916.
Werner Siemens aus Anlass der 100sten Wiederkehr seines Geburtstages.* Conrad Matschoss. (48) Dec. 16, 1916.
Die Friedensziele der deutschen Industrie und des deutschen Ausfuhrhandels. W. Beumer. (50) Dec. 21, 1916.
Die spezifische Wärme C p der Luft bei 60° und 1 bis 300 at. L. Holborn and M. Jakob. (48) Feb. 17, 1917.
Auslandswährung und Inlandsteuerung. Walter v. Caron-Eldingen. (50) Apr. 5, 1917.
Zum Warenumsatzstempelgesetz. K. Dittmar. (50) Apr. 12, 1917.
Die Ansprüche Deutscher gegen Amerikaner im Kriegsfalle. Ludwig Fuld. (50) Apr. 19, 1917.
Zur Ausbildung von weiblichen Hülfskräften in der Industrie.* F. Ludwig. (48) May 12, 1917.
Die Rohstoffbezugsverträge der deutschen Eisenindustrie mit Angehörigen feindlicher Staaten. Ludwig Fuld. (50) June 7, 1917.
Normaltemperatur und Gebrauchstemperatur. Plato. (48) June 16, 1917.
Normaltemperatur und Gebrauchstemperatur. J. Reindl. (48) Aug. 11, 1917.
Ingenieur und öffentliches Leben. A. v. Rieppel. (48) Dec. 15, 1917.

Municipal.

The Water Distribution System of Industrial Housing Projects for Shipbuilders.* William H. C. Ramsey. (59) Mar.

Railroads.

Modern Tendencies in Roundhouse Design.* Exum M. Haas. (4) Nov., 1919.
Preparation of the Locomotive at Engine-Houses and Shops and Its Relation to Fuel Economies. Leslie R. Pyle. (61) Jan.
The Calculation of Track Pressure Drop and Track Losses on Direct Current Electric Railways.* F. F. P. Bisacre. (73) Serial beginning Feb. 20.
The Last Stand of the Reciprocating Steam Engine.* A. H. Armstrong. (42) Mar.
Automatic Railway Substations.* Frank W. Peters. (42) Mar.
Short-Circuit Protection for Direct-Current Sub-Stations.* J. J. Linebaugh. (42) Mar.
Some Notes on the Pneumatic Tie Tamper.* W. H. Armstrong. (87) Mar.
New O-6-2 Type Tank Locomotives for the Taff Vale Railway.* (21) Mar.
Paint Pipe Lines in a Cuban Car Shop.* J. P. Risque. (25) Mar.
Modernizing Freight Car Repair Facilities.* Gustave E. Lemmerich. (25) Mar.
Advantages of Stoker Fired Locomotives.* D. F. Crawford. (Abstract of paper read before Ry. Club of Pittsburgh.) (25) Mar.; (15) Mar. 5.
Riveting Locomotive Fireboxes.* (21) Mar.
The Trans-Sahara Railroad.* (19) Mar.
Sequence of Notes for and Calculation of Cross-Section.* O. G. Bunsen. (13) Mar. 4.
Heavy Construction on San Diego and Arizona Railway.* (13) Mar. 4.
New York Central Railroad Accommodates Itself to Construction of Barge Canal.* B. S. Voorhees. (13) Mar. 11.
Twenty Years of Reinforced-Concrete Railway Ties.* Cyril H. Wakefield. (13) Mar. 11.
New Engine Terminal for Lehigh Valley Railroad.* (13) Mar. 11.
Motorized Freight Transfer Cuts Terminal Costs.* (13) Mar. 11.
Resurveys of Old Railway Lines.* J. G. Wetherell. (13) Mar. 18.
Location and Structures of a Heavy Industrial Railway.* (13) Mar. 25.
A Terminal Built for Special Operating Conditions.* (15) Mar. 26.
New Electric Cars Built for British Line.* Frederick C. Coleman. (25) Apr.
Pennsylvania Decapod Shows High Economy.* (25) Apr.
Système d'Eclairage Electrique des Trains, des Ateliers de Construction d'Oerlikon.* (33) Feb. 7.
Les Mesures Graphiques des Actions Dynamiques Périodiques au Moyen du "Dynametre".* L. Schlüssel. (33) Feb. 7.
L'Electrification des Chemins de Fer aux Etats-Unis: Rapport de M. Maudint sur la Visite d'une Mission d'Etudes.* (33) Feb. 7.

* Illustrated.

Miscellaneous—(Continued).

Dampfschiffahrt Rheinschiffahrtsverbindung mit Belgien-Norden. Industrieentwicklung der Rheinhäfen." Oskar Stinnesbank. (20) Serial beginning Sept. 24, 1919.

Die Eisenbahnwerkstätten und ihre Einteilung für Unterhalt, Neubau, Umbau, Verbesserung und Wiederherstellung von Lokomotiven in den Jahren 1914 und 1915." Schlesinger. (20) Serial beginning. (20) Serial beginning Oct. 2, 1919.

Industrie und Ausbau der Binnenschiffahrtswege in allgemeinwirtschaftlicher Berg- und Hüttenverhältnisse Preußens Westen." (20) Dec. 19, 1919.

Die Steuerung der Lokomotive. Heusinger von Waldegg. (20) Serial beginning Dec. 14, 1918.

Werner Siemens zum Andenken. Siemens & Halske. (20) Serial beginning Dec. 14, 1918.

Materialien." (20) Dec. 19, 1919.

Die Preisbewegung der deutschen Industrie und die deutschen Ausfuhrhandels. W. Bumm. (20) Dec. 27, 1919.

Die elektrische Werke G m der Lok bei 60° und 1 bis 500 at. L. Hollerer und M. Jakob. (20) Nov. 13, 1919.

Arbeitsbeschaffung und Güterverkehr. Walter v. Cramm-Burgdorf. (20) Apr. 5, 1917.

Zum Wärmemessbedürfnis. K. Gärtner. (20) Apr. 12, 1917.

Die Amerikanische Dreizylinder Heiß Automotor in Kriegszeit. Ludwig Pfaff. (20) Apr. 19, 1917.

Zur Ausbildung von weiblichen Hilfskräften in der Industrie." F. Ludwig. (20) May 12, 1917.

Die Normalbauanstalten der Deutschen Eisenbahnverw. und Angehörigen Privatbahnen.

Diesel. Ludwig Pfaff. (20) June 7, 1917.

Verbrennungsmotor und elektrischer Antrieb. Thein. (20) June 16, 1917.

Verbrennungsmotor und Dieselmaschine." J. Pfaff. (20) Jun 21, 1917.

Treibmittel und ortsfestes Lager. A. v. Hippel. (20) Dec 26, 1917.

Municipal.

The Water Purification System of Industrial Timeline Projects for Shipbuilders." William H. C. Hennecy. (20) Mar.

Railroads.

Modern Trendgerät in Innenräume Design." Elmo M. Glass. (4) Nov. 1919.

Progression of the Locomotive at Eagle-Homes and Stone and Its Relation to Pad Economics. Lewis E. Pyle. (4) Jan.

The Calculation of Truck Pressure Drop and Truck Lenses on Diesel Current Electric Railways." F. C. S. Disere. (12) Serial beginning Feb. 20.

The Last Stand of the Reciprocating Steam Engine." A. H. Armstrong. (42) Mar.

Automatic Railway Signalling." Frank W. Peters. (42) Mar.

Report Israel Freedom for Iowa Current Subscriptions." J. A. Lapham. (12) Mar.

Some Notes on the Economic The Tonnage." W. H. Armstrong. (42) Mar.

New C-D-2 Type Tank Locomotives for the Taf Vale Railway." (12) Mar.

Paint Fire Lines in a Cotton Fire Room." J. P. Hodge. (42) Mar.

Modernizing Power Car Depot Facilities." Gregory E. Lemmerich. (42) Mar.

Advantages of Double Fired Locomotives." D. F. Crawford. (Abstract of paper read before Pa Club of Pittsburgh). (42) Mar.; (12) Mar. 6.

Electric Locomotive Tyrehouse." (12) Mar.

The Texas Sabra Railroad." (12) Mar.

Equipment of Notes for and Calculation of Cross-Section." C. C. Hudson. (12) Mar. 4.

Heavy Construction on San Diego and Arizona Railway." (12) Mar 4.

New York Central Railroad Accommodates Need to Construction of Barge Canal." C. S. Yoorhees. (12) Mar. 11.

Twenty Years of Relations-Concrete Railway Ties." Cyril C. Wakefield. (12) Mar. 11.

New Design Terminal for Lehigh Valley Railroad." (12) Mar. 11.

Motorless Product Transfer Car Terminal Costs." (12) Mar. 11.

Recurvya of Old Railway Lines." J. C. Wetherell. (12) Mar 18.

Location and Structure of a Heavy Industrial Railway." (12) Mar 25.

A Terminal Bath for Special Operating Conditions." (18) Mar 20.

New Electric Cars Built for British Line." Frederick C. Coleman. (12) Apr.

Pennsylvania Decapod Shows High Economy." (12) Apr.

Bergbahn d'Exploraz Modernes des Trains, des Arbres de Construction d'Oerlikon." (12) Feb 7.

Les Moyens Graphiques des Actions Dynamiques Différentes au Moyen du "Dynamotor." L. Rabinaud. (12) Feb 7.

L'Electrification des Chemins de Fer aux Etats-Unis: Rapport de M. Mailhat sur la Visite d'une Mission d'Ingénieurs." (12) Feb 7.

---

* Illustrated.

Railroads—(Continued).

L'Electrification des Chemins de Fer aux Etats-Unis et la Protection des Lignes Télégraphiques et Téléphoniques. (33) Feb. 14.
L'Utilisation Rationnelle des Forces Naturelles, Moteurs à Explosion à Rendement Elevé et Dispositifs Améliorant le Rendement des Locomotives à Vapeur.* L. Pierre-Guédon. (33) Feb. 14.
Neuere Motorlokomotiven.* W. Schwarz. (48) May 13, 1916.
Neue Sicherheits-Wägevorrichtungen.* Darmstädter. (48) June 3, 1916.
Der gegenwärtige Stand der Erzeugung von Hartgusswagenrädern.* Karl Irresberger. (50) June 29, 1916.
Uebersicht über die seitherigen Bestrebungen und Mittel zur Verhütung des Schienenwanderns.* Wilhelm Klutmann. (50) Serial beginning Aug. 24, 1916.
Verhoop-Steuerung für Dampflokomotiven.* Ericson. (48) Sept. 2, 1916.
Flusseisenbleche für Lokomotivfeuerbüchsen.* Kittel. (48) Sept. 9, 1916.
Offene Güterwagen mit Selbstenladeeinrichtung. Wilh. Jösch. (50) Dec. 14, 1916.
Eiserne Personenwagen in Deutschland.* W. Rudolph. (50) Jan. 4, 1917.
Untersuchungsverfahren für Schwingensteuerungen an Lokomotiven.* Sanzin. (48) Feb. 17, 1917.
1 C 1-Personenzug-Heissdampflokomotive der Brasilianische Zentralbahn.* Ludwig Schneider. (48) Mar. 31, 1917.
Herstellung von Eisenbahnwagen-Radsätzen. Otto Jacken. (48) Serial beginning May 5, 1917.
Beanspruchung eines Lokomotivzylinderdeckels mit über die Dichtfläche frei hinausragendem Schraubenflansch.* Huldr. Keller. (48) June 23, 1917.
Neue Bauart von Schnellzuglokomotiven mit zwei getrennten Triebwerken für besonders grosse Leistung.* R. Sanzin. (48) Aug. 16, 1919.

Railroads, Street.

Passengers and Freight Carried More Cheaply by Motor Transport Than by Railway.* Kenneth Q. Volk. (13) Mar. 18.
Overhead Practice and Experience in Atlanta.* (17) Mar. 20.
Track Construction from the Paving Maintenance Standpoint.* (17) Mar. 20.
Maintenance Practice of the Anglo-Argentine Tramway.* R. Francisco Apeseche. (17) Serial beginning Mar. 20.
Die grossen Verkehrsaufgaben Berlins und ihre Durchführung während des Krieges.* F. Krause. (48) Mar. 17, 1917.

Roads and Pavements.

Wood Block Paving.* Walter Buehler. (4) Feb.
Concrete Road Construction in Nebraska.* A. S. Mirick. (36) Feb.
A Few Notes on Road Maintenance with Special Reference to Devonshire.* W. P. Robinson. (114) Feb. 28.
Surface Treatments on Macadam and Gravel.* Philip P. Sharples. (Paper read before Am. Road Builders' Assoc.) (60) Mar.; (86) Mar. 3.
Use of Labor-Saving Devices on Highway Construction. Richard Hopkins. (Paper read before Am. Road Builders' Assoc.) (60) Mar.
Making Payments on Road Construction Contracts. C. Coykendall. (60) Mar.
Procedure in the Construction of Bituminous Macadam Roadways.* J. E. Pennybacker. (Paper read before Am. Road Builders' Assoc.) (60) Mar.
Laboratory Tests of Granite Paving Block and Suggested Specification. F. H. Jackson. (86) Mar. 3.
Equipment for Concrete Road Construction.* B. H. Piepmeier. (86) Mar. 3.
Fundamental Considerations for Concrete Pavement Design.* S. T. Morse. (86) Mar. 3.
Proper Methods and Bad Practices in Bituminous Concrete Construction. Theodore S. Oxholm. (Abstract of paper read before Am. Road Builders' Assoc.) (86) Mar. 3.
Recent Developments in Brick Paving Practice. M. B. Greenough. (From paper read before Am. Road Builders' Assoc.) (86) Mar. 3.
Relation of Highways to Motor Truck Operating Cost. Arthur H. Blanchard. (From paper read before National Highway Traffic Assoc.) (86) Mar. 3 (96) Mar. 4.
Highway Drainage. U. W. Christie. (Paper read before Assoc. of Ontario Land Surveyors.) (96) Mar. 4.
All Sand Aggregate for Concrete in Middle Western Roads. T. L. Brockway. (Abstract of paper read before Am. Soc. of Municipal Impvts.) (13) Mar. 18.
Drainage in Road Construction. G. R. Marston. (Paper read before County Engrs. and Road Supts. of Ontario.) (96) Mar. 18.
Value of Top Soil as Base for Modern Highways. D. S. Humphreys. (13) Mar. 18.

Sanitation.

Development of Activated Sludge Process at Manchester, England. (Excerpts from Report of Manchester Rivers Dept.) (96) Feb. 26.

---

* Illustrated.

Railroads—(Continued).

* Indexed.

Sanitation—(Continued).

Rules for the Operation of Sewage Treatment Plants. H. R. Abbott. (60) Mar.
Operating Experiences with Imhoff Sewage Tanks.* W. G. Kirchoffer. (Paper read before Illinois Soc. of Engrs.) (60) Mar.
Sewer System and Treatment of Works at Fort Sheridan. H. R. Abbott. (From Illinois Soc. Engrs.' *Proceedings.*) (117) Mar.
Joint Sewage Disposal of Indiana Lake Cities.* (13) Mar. 4.
Design of York Township Sewerage System.* J. M. M. Greig. (96) Mar. 4.
Storm Water Sewer Construction at Hamilton, Ohio.* R. B. McWhorter. (From Miami Conservancy *Bulletin.*) (86) Mar. 10.
The Work of a Sanitary Section with the B. E. F., France. Osmond Cattlin. (114) Mar. 13.
Die Prüfstelle für Ersatzglieder in Charlottenburg.* (48) Apr. 1, 1916.
Werkstätten für Kriegsbeschadigte.* Beckmann. (48) Apr. 8, 1916.
Prüfstelle für Ersatzglieder in Charlottenburg: Die Normalisierung der Schraubengewinde und der Befestigungszapfen der Ansatzstücke.* Leymann und Schlesinger. (48) June 3, 1916.
Der Prüfstelle für Ersatzglieder in Charlottenburg; Allgemeine Grundsätze für die Untersuchung von Ersatzarmen.* (48) Aug. 12, 1916.
Das Zusammenarbeiten von Arzt und Ingenieur in der Prüfstelle für Ersatzglieder.* G. Schlesinger. (48) Nov. 11, 1916.
Die Entwicklung des Baues Künstlicher Hände und Arme.* C. Barth und G. Schlesinger. (48) Dec. 30, 1916.
Die Reibungsgelenke, ihre Eigenschaften und Konstruktionsbedingungen.* G. Schlesinger und C. Volk. (48) Jan. 13, 1917.
Unterarmbandagen.* (48) Jan. 27, 1917.
Die Herstellung der Keller-Hand.* G. Schlesinger. (48) Apr. 14, 1917.
Berufliche Wiedererttüchtigung der Kriegsbeschädigten.* (48) Apr. 28, 1917.
Neuzeitliche Lüftungsanlage einer Hotel-Küche.* W. Dahlheim. (48) June 30, 1917.
Ueber den Gang mit Kunstbeinen.* R. du Bois-Reymond. (48) Aug. 4, 1917.
Die Mitarbeit des Ingenieurs bei der Durchbildung der Ersatzglieder.* G. Schlesinger. (48) Serial beginning Sept. 8, 1917.
Die Herstellung der Berliner Hand.* G. Schlesinger. (48) Oct. 20, 1917.
Die Aussichten der elektrischen Raumheizung in der Schweiz. M. Hottinger. (107) Feb. 7.

Structural.

Standards for Brass and Bronze Foundries and Metal-Finishing Processes.* Lillian Erskine. (56) Vol. 60, 1919.
Photo-Elastic and Strain Measurements of the Effects of Circular Holes on the Distribution of Stress in Tension Members.* E. C. Coker, K. C. Chakko and T. Satake. (11) Serial beginning Feb. 20.
Fixed-Fee Contract for Building Construction. F. A. Wells. (Paper read before Associated General Contractors of America.) (117) Mar.
Concrete Facing Wall at Foot of High Cut.* (117) Mar.
Fireproofing Wooden Structures with Concrete.* (117) Mar.
Concrete in Water-Works Construction.* A. C. Irwin. (59) Mar.
Owner Protection in Building Construction.* F. A. Wells. (67) Mar.
The Protection of Concrete Buildings Against Damp.* (From *La Revue des Materiaux de Construction et de Travaux Publics.*) (67) Mar.
The Use of Reinforced Concrete. H. Adams. (Abstract of paper read before Soc. of Archts.) (21) Mar.
Gypsum Roof Decks for Hydro-Electric Buildings.* Curtis F. Columbia. (60) Mar.
Self-Supporting Chimneys to Withstand Earthquake.* C. R. Weymouth. (55) Mar.
An Apparatus for Determining the Consistency of Concrete.* F. L. Roman. (86) Mar. 3.
Designing Concrete Columns with Cast-Iron Core.* W. H. Roney, Jr. (13) Mar. 4.
Method of Protecting Concrete in Zero Weather Construction Operation.* (86) Mar. 17.
Decay of Factory Roofs Checked by Proper Heating.* F. J. Hoxie. (From paper read before Am. Soc. of Heating and Ventilating Engrs.) (13) Mar. 18.
Planning and Progress on a Big Construction Job.* Charles Penrose. (13) Serial beginning Mar. 18.
Plastered or Concrete Gun Types of Concrete Houses. (From Committee Report read before National Conference on Concrete House Construction.) (86) Mar. 24.
The Case of Initial Tension.* R. Fleming. (86) Mar. 24.
Wind Bracing in the Steel Frames of Office Buildings.* W. M. Wilson and F. E. Richart. (86) Mar. 24.
Concrete-Beam Diagram with Top and Bottom Steel.* Arthur G. Hayden. (13) Mar. 25.

---

* Illustrated.

* Illustrated.

Structural—(Continued).

Festigkeit von Asbest bei höherer Temperatur.* Fritz Bayer. (48) June 24, 1916.
Berechnung des Kleinsten Trägheitsmomentes der hierunter dargestellten Säulenprofile.* J. Schmidt. (48) Aug. 12, 1916.
Der Körnungsgrad und die physikalischtechnischen Eigenschaften der Metalle.* J. Czochralski. (50) Sept. 7, 1916.
Versuche zur Klarstellung der Wirkungsweise der Umschnürung bei Eisenbetonsäulen.* M. Rudeloff. (48) Oct. 7, 1916.
Zur Abhängigkeit der Bruchdehnung flusseiserner Kesselbleche von der Messlänge. C. Bach und R. Baumann. (48) Oct. 14, 1916.
Breitflanschige und parallelflanschige I-Eisen. Richard Sonntag. (48) Serial beginning Oct. 28, 1916.
Die Normalprofile für Formeisen, ihre Entwicklung und Weiterbildung. H. Fischmann. (50) Serial beginning Jan. 4, 1917.
Das elektrolytische Verfahren zur Verhütung der Zerfressungen von Metallen.* Janzen. (48) Feb. 17, 1917.
Beziehungen zwischen Druckfestigkeit und Biegungsfestigkeit.* H. Kayser. (48) Serial beginning Feb. 3, 1917.
Beitrag zur Kenntnis der Hochofenschlacken.* W. Harnickell und R. Durrer. (50) Mar. 8, 1917.
Zum Einfluss der Stabform auf die Ergebnisse der Zugversuche mit Metallen.* M. Rudeloff. (50) Serial beginning Apr. 5, 1917.
Ueber den Einfluss des Siliziums und der Glühdauer auf die mechanisch-physikalischen Eigenschaften des schmiedbaren Gusses.* E. Leuenberger. (50) Serial beginning May 31, 1917.
Asbestisolierung.* Fritz Bayer. (48) Serial beginning June 9, 1917.
Formänderungsversuche mit breit-und parallelflanschigen I-Eisen auf Grund vergleichender statischer Untersuchungen von breit- und schmalflanschigen I-Eisen. Richard Sonntag. (48) Serial beginning July 7, 1917.
Ersatz für Eisenbauten.* Karl Bernhard. (48) July 14, 1917.
Stützdruckschwankungen beim Befahren von Plattformen durch Lastenzüge.* P. Krell. (48) July 28, 1917.

Topographical.

The Airplane in Surveying and Mapping. E. Lester Jones. (100) Jan.-Feb.
Resurveys of Old Railway Lines.* J. G. Wetherell. (13) Mar. 18.

Water Supply.

Maximum Rates of Precipitation at Boston for Various Frequencies of Occurrence.* Harrison P. Eddy. (109) Feb.
Concrete in Water-Works Construction.* A. C. Irwin. (59) Mar.
Javellization. (59) Mar.
Notes on Experiences with the Presumptive and Confirmatory Tests for *B. Coli* in Water Analysis for the American Expeditionary Forces.* Max Levine. (59) Mar.
A Water Supply of the Service of Supplies, A. E. F.* Jack J. Hinman, Jr. (59) Mar.
Temporary Contamination of a Deep Well Supply at Montgomery, Alabama. G. H. Hazelhurst. (59) Mar.
Method of Metering the Water Supplied to the Five Distribution Systems of the City of Newark, N. J.* George Sanzenbacher. (59) Mar.
Air Lift Pumping and Water Purification.* John Oliphant. (59) Mar.
Air Lift Pumps. Chas. J. Deem. (59) Mar.
The Water Distribution System of Industrial Housing Projects for Shipbuilders.* William H. C. Ramsey. (59) Mar.
Substitutes for Lead in Joints. Thomas Healy. (59) Mar.
Water-Works for Fire Protection. H. F. Blomquist. (59) Mar.
Fontana Power-Irrigation Development.* C. H. Tallant. (111) Mar. 1.
Some Notes on California Rainfall.* C. E. Grunsky. (111) Mar. 1.
Muscle Shoals Hydro-Electric Development.* Chester H. Jones. (105) Mar. 3.
Impounding Reservoir for Water Supply of Oklahoma City.* (13) Mar. 4.
Design Details and Field Methods on Thin Arch Dam.* (13) Mar. 4.
The Record of 100 Dam Failures.* Lars Jorgensen. (111) Mar. 15.
Conserving the Water Table in Electric Pumping.* Chas. H. Lee. (111) Mar. 15.
Water for Shipyard Drinking Fountain Treated by Violet Rays.* Walter L. Decker. (13) Mar. 18.
Flood-Protection Reservoir for Decorah, Iowa.* (13) Mar. 18.
Hydro-Electric Development at St. Jerome, Que.* L. A. Wright. (96) Mar. 18.
Pond-Level Control for Hydro Plants.* Earl Stafford. (27) Mar. 20.
Utilité et Applications de la Mesure des Précipitations Atmosphérique.* Paul Lévy-Salvador. (33) Feb. 7.
Tube de Pitot Integrateur pour la Mesure de la Vitesse Moyenne des Courants Variables.* (33) Feb. 14.

* Illustrated.

Periodicals—(Continued).

Transactions of the Institution of Engineers and Shipbuilders in Scotland. (Vol. LXIII. Part 3.) Glasgow: 1920.

Transactions of the Institution of Mining Engineers. (Vol. LIX. Part 5.) Newcastle-upon-Tyne: 1920.

Transactions of the Institution of Naval Architects. (Vol. LXII.) London: 1920.

Water Supply.

Water Supply Engineer. (Vol. XXXII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XIII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XIII. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XIII. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XIII. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XIII. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XIII. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XIII. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XIV. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XIV. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XIV. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XIV. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XIV. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XIV. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XIV. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XIV. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XIV. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XIV. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XIV. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XIV. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XV. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XV. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XV. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XV. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XV. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XV. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XV. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XV. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XV. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XV. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XV. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XV. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XVI. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XVI. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XVI. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XVI. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XVI. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XVI. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XVI. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XVI. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XVI. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XVI. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XVI. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XVI. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XVII. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XVII. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XVII. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XVII. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XVII. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XVII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XVII. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XVII. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XVII. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XVII. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XVII. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XVII. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XVIII. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XVIII. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XVIII. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XVIII. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XVIII. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XVIII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XVIII. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XVIII. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XVIII. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XVIII. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XVIII. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XVIII. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XIX. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XIX. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XIX. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XIX. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XIX. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XIX. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XIX. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XIX. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XIX. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XIX. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XIX. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XIX. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XX. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XX. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XX. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XX. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XX. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XX. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XX. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XX. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XX. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XX. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XX. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XX. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXI. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXI. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXI. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXI. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXI. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXI. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXI. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXI. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXI. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXI. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXI. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXI. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXII. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXII. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXII. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXII. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXII. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXII. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXII. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXII. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXII. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXII. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXII. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXIII. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXIII. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXIII. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXIII. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXIII. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXIII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXIII. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXIII. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXIII. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXIII. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXIII. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXIII. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXIV. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXIV. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXIV. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXIV. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXIV. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXIV. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXIV. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXIV. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXIV. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXIV. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXIV. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXIV. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXV. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXV. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXV. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXV. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXV. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXV. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXV. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXV. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXV. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXV. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXV. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXV. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXVI. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXVI. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXVI. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXVI. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXVI. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXVI. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXVI. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXVI. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXVI. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXVI. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXVI. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXVI. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXVII. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXVII. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXVII. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXVII. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXVII. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXVII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXVII. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXVII. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXVII. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXVII. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXVII. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXVII. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXVIII. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXVIII. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXVIII. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXVIII. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXVIII. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXVIII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXVIII. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXVIII. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXVIII. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXVIII. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXVIII. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXVIII. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXIX. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXIX. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXIX. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXIX. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXIX. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXIX. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXIX. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXIX. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXIX. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXIX. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXIX. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXIX. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXX. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXX. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXX. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXX. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXX. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXX. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXX. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXX. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXX. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXX. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXX. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXX. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXXI. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXXI. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXXI. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXXI. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXXI. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXXI. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXXI. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXXI. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXXI. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXXI. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXXI. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXXI. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXXII. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXXII. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXXII. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXXII. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXXII. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXXII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXXII. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXXII. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXXII. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXXII. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXXII. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXXII. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXXIII. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXXIII. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXXIII. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXXIII. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXXIII. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXXIII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXXIII. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXXIII. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXXIII. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXXIII. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXXIII. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXXIII. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXXIV. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXXIV. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXXIV. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXXIV. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXXIV. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXXIV. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXXIV. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXXIV. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXXIV. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXXIV. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXXIV. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXXIV. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXXV. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXXV. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXXV. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXXV. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXXV. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXXV. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXXV. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXXV. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXXV. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXXV. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXXV. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXXV. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXXVI. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXXVI. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXXVI. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXXVI. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXXVI. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXXVI. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXXVI. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXXVI. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXXVI. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXXVI. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXXVI. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXXVI. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXXVII. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXXVII. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXXVII. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXXVII. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXXVII. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXXVII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXXVII. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXXVII. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXXVII. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXXVII. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXXVII. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXXVII. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXXVIII. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXXVIII. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXXVIII. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXXVIII. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXXVIII. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXXVIII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXXVIII. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXXVIII. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXXVIII. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXXVIII. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXXVIII. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXXVIII. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XXXIX. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XXXIX. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XXXIX. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XXXIX. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XXXIX. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XXXIX. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XXXIX. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XXXIX. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XXXIX. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XXXIX. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XXXIX. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XXXIX. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XL. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XL. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XL. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XL. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XL. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XL. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XL. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XL. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XL. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XL. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XL. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XL. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XLI. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XLI. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XLI. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XLI. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XLI. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XLI. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XLI. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XLI. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XLI. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XLI. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XLI. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XLI. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XLII. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XLII. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XLII. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XLII. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XLII. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XLII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XLII. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XLII. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XLII. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XLII. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XLII. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XLII. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XLIII. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XLIII. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XLIII. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XLIII. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XLIII. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XLIII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XLIII. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XLIII. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XLIII. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XLIII. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XLIII. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XLIII. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XLIV. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XLIV. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XLIV. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XLIV. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XLIV. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XLIV. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XLIV. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XLIV. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XLIV. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XLIV. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XLIV. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XLIV. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XLV. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XLV. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XLV. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XLV. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XLV. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XLV. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XLV. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XLV. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XLV. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XLV. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XLV. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XLV. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XLVI. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XLVI. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XLVI. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XLVI. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XLVI. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XLVI. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XLVI. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XLVI. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XLVI. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XLVI. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XLVI. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XLVI. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XLVII. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XLVII. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XLVII. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XLVII. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XLVII. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XLVII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XLVII. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XLVII. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XLVII. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XLVII. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XLVII. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XLVII. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XLVIII. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XLVIII. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XLVIII. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XLVIII. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XLVIII. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XLVIII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XLVIII. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XLVIII. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XLVIII. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XLVIII. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XLVIII. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XLVIII. No. 12.) London: 1920.

Water Supply Engineering. (Vol. XLIX. No. 1.) London: 1920.

Water Supply Engineering. (Vol. XLIX. No. 2.) London: 1920.

Water Supply Engineering. (Vol. XLIX. No. 3.) London: 1920.

Water Supply Engineering. (Vol. XLIX. No. 4.) London: 1920.

Water Supply Engineering. (Vol. XLIX. No. 5.) London: 1920.

Water Supply Engineering. (Vol. XLIX. No. 6.) London: 1920.

Water Supply Engineering. (Vol. XLIX. No. 7.) London: 1920.

Water Supply Engineering. (Vol. XLIX. No. 8.) London: 1920.

Water Supply Engineering. (Vol. XLIX. No. 9.) London: 1920.

Water Supply Engineering. (Vol. XLIX. No. 10.) London: 1920.

Water Supply Engineering. (Vol. XLIX. No. 11.) London: 1920.

Water Supply Engineering. (Vol. XLIX. No. 12.) London: 1920.

Water Supply Engineering. (Vol. L. No. 1.) London: 1920.

Water Supply Engineering. (Vol. L. No. 2.) London: 1920.

Water Supply Engineering. (Vol. L. No. 3.) London: 1920.

Water Supply Engineering. (Vol. L. No. 4.) London: 1920.

Water Supply Engineering. (Vol. L. No. 5.) London: 1920.

Water Supply Engineering. (Vol. L. No. 6.) London: 1920.

Water Supply Engineering. (Vol. L. No. 7.) London: 1920.

Water Supply Engineering. (Vol. L. No. 8.) London: 1920.

Water Supply Engineering. (Vol. L. No. 9.) London: 1920.

Water Supply Engineering. (Vol. L. No. 10.) London: 1920.

Water Supply Engineering. (Vol. L. No. 11.) London: 1920.

Water Supply Engineering. (Vol. L. No. 12.) London: 1920.

Water Supply Engineering. (Vol. LI. No. 1.) London: 1920.

Water Supply Engineering. (Vol. LI. No. 2.) London: 1920.

Water Supply Engineering. (Vol. LI. No. 3.) London: 1920.

Water Supply Engineering. (Vol. LI. No. 4.) London: 1920.

Water Supply Engineering. (Vol. LI. No. 5.) London: 1920.

Water Supply Engineering. (Vol. LI. No. 6.) London: 1920.

Water Supply Engineering. (Vol. LI. No. 7.) London: 1920.

Water Supply Engineering. (Vol. LI. No. 8.) London: 1920.

Water Supply Engineering. (Vol. LI. No. 9.) London: 1920.

Water Supply Engineering. (Vol. LI. No. 10.) London: 1920.

Water Supply Engineering. (Vol. LI. No. 11.) London: 1920.

Water Supply Engineering. (Vol. LI. No. 12.) London: 1920.

Water Supply Engineering. (Vol. LII. No. 1.) London: 1920.

Water Supply Engineering. (Vol. LII. No. 2.) London: 1920.

Water Supply Engineering. (Vol. LII. No. 3.) London: 1920.

Water Supply Engineering. (Vol. LII. No. 4.) London: 1920.

Water Supply Engineering. (Vol. LII. No. 5.) London: 1920.

Water Supply Engineering. (Vol. LII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. LII. No. 7.) London: 1920.

Water Supply Engineering. (Vol. LII. No. 8.) London: 1920.

Water Supply Engineering. (Vol. LII. No. 9.) London: 1920.

Water Supply Engineering. (Vol. LII. No. 10.) London: 1920.

Water Supply Engineering. (Vol. LII. No. 11.) London: 1920.

Water Supply Engineering. (Vol. LII. No. 12.) London: 1920.

Water Supply Engineering. (Vol. LIII. No. 1.) London: 1920.

Water Supply Engineering. (Vol. LIII. No. 2.) London: 1920.

Water Supply Engineering. (Vol. LIII. No. 3.) London: 1920.

Water Supply Engineering. (Vol. LIII. No. 4.) London: 1920.

Water Supply Engineering. (Vol. LIII. No. 5.) London: 1920.

Water Supply Engineering. (Vol. LIII. No. 6.) London: 1920.

Water Supply Engineering. (Vol. LIII. No. 7.) London: 1920.

Water Supply Engineering. (Vol. LIII. No. 8.) London: 1920.

Water Supply Engineering.

Water Supply—(Continued).

Das hydraulische Akkumulierwerk in Neckartenzlingen.* R. Thomann. (48) Serial beginning Apr. 15, 1916.

Die Bedeutung erweiterter Mundstücke bei Rohrleitungen welche Wasser dicht unter dem Niedrigwasserstand offener Behälter entnehmen das zulässige Gefälle solche Rohranlagen.* Winkel. (48) Apr. 29, 1916.

Das Wasserkraft-Elektrizitätswerk der Papelera Española am Gándara in Spanien.* Otto Mohr und Gg. von Troeltsch. (48) Serial beginning May 6, 1916.

Gleichgewichtsbedingungen für Flüssigkeitsströmungen in geraden Leitungen.* Rudolf Camerer. (48) Nov. 4, 1916.

Hohler Eisenbeton-Staudamm mit selbsttätigem Ueberfall-Klappenwehr.* O. Sommer. (48) Nov. 18, 1916.

Neuere Wasserturbinenanlagen in Deutschland.* V. Graf. (48) Serial beginning Jan. 6, 1917.

Spiegelschwingungen in Turbinen-Triebkanalen.* Eugen Feifel. (48) Serial beginning Jan. 20, 1917.

Ueber selbsttätige Abflussregulierungen bei Wasserkraftanlagen und Stauanlagen mit wechselndem Gefälle.* E. Treiber. (48) Serial beginning Feb. 17, 1917.

Höchstausnutzung der Gefälle mit Kleinstem Aufwand bei Erschliessung unserer Niederdruckwasserkräfte; ihr Einfluss auf die wirtschaftlichen Verhältnisse Bayerns und auf die Unabhängigkeit des Reiches vom Auslande.* Johann Hallinger. (48) Serial beginning Mar. 3, 1917.

Gleichgewichtsbedingungen für Flüssigkeitsströmungen in geraden Leitungen.* D. Thoma. (48) May 5, 1917.

Berechnung von Ausfluss- und Ueberfallzahlen.* R. v. Mises. (48) Serial beginning May 26, 1917.

Die versuchsmässige Bestimmung der Ausflusszahlen von Ponceletöffnungen für Wasser und Kochsalzlösungen und Erörterung des inneren Zusammenhanges dieser Zahlen.* Adolf Schneider. (48) June 23, 1917.

Versuche über Strömungen in stark erweiterten Kanälen.* Richard Kröner. (48) Serial beginning July 21, 1917.

Düsencharakteristik.* Gustav Flügel. (48) Aug. 4, 1917.

Waterways.

Construction of Lock D, Cumberland River.* Rufus W. Pafford. (100) Jan.-Feb.

Surges in Gaillard Cut from Lockages at Pedro Miguel, Panama Canal.* R. Z. Kirkpatrick and H. G. Cornthwaite. (100) Jan.-Feb.

Moving Earth with Steam Shovel and Hydraulic Giants. (117) Mar.

The Lake Spalding Dam.* I. G. Steel. (117) Mar.

Method of Estimating Backwater on a River.* Albion Davis. (From *Stone & Webster Journal.*) (86) Mar. 10.

"Plastic Fill" Method of Embankment Construction.* (From Miami Conservancy *Bulletin.*) (86) Mar. 17.

Flexible Rafts Protect River Banks from Cutting.* (15) Mar. 19.

Stationary Concreting Plant for Constructing 1 036 Ft. River Wall at Dayton.* (From Miami Conservancy *Bulletin.*) (86) Mar. 24.

Ocean Pier to Be Scrapped Because of Concrete Distintegration.* (13) Mar. 25.

The Panama Canal To-Day.* J. Bernard Walker. (46) Mar. 27.

Etude Théorique d'une Usine Actionnée par la Marée. P. Caufourier. (33) Feb. 14.

L'Outillage Mécanique des Ports: Les Appareils de Manutention des Minerais et des Charbons aux Etats-Unis.* (33) Feb. 14.

Der selbsttätige Regler des Sektorwehres in der Weser bei Bremen.* L. Plate. (48) Nov. 10, 1917.

---

* Illustrated.